



November 6, 2014

National List Manager
USDA/AMS/NOP, Standards Division
1400 Independence Ave. SW
Room 2648-So., Ag Stop 0268
Washington, DC 20250-0268

Re: Petition to remove Lignin Sulfonate - As floating agents in postharvest handling from the National List as a synthetic substance allowed for use in organic crop production under §205.601(l)(1).

Dear National List Manager:

Please accept the attached petition to remove Lignin Sulfonate as floating agents in postharvest handling from the National List as a synthetic substance allowed for use in organic crop production under §205.601(l)(1) based on a lack of essentiality.

Lignin Sulfonate was placed on the original National List and was retained during Sunset Reviews in 2006 and 2011. Prior to its original listing, the 1995 TAP review suggested that Lignin Sulfonate was the “best product for pear floatation available.” While this may have been true at the time, in today’s practices it is not widely used, if at all.

As part of a recent outreach project, the Organic Trade Association conducted a poll of all certified organic pear packing facilities in the U.S. The poll was based upon the NOP list of certified handlers that are certified to pack organic pears and cross referenced with the organic shipper’s list from Pear Bureau NW. Each operation was accounted for either through direct contact by OTA personnel or consult with their ACAs that referenced approved OSPs on file. This research showed that none of these handlers are using lignin sulfonate. They have all either switched to floatless systems that do not use floating agents or, when necessary, are using one of the alternative materials on the National List that may be used as a floating agent (i.e., sodium silicate, sodium carbonate, potassium carbonate).

This suggests that while floating agents may still be used by some organic pear packers, this use of lignin sulfonate is no longer essential to organic production. It is on this basis that OTA is filing this petition to remove lignin sulfonate from 205.601(l)(1) as a floating agent in post-harvest handling.

If you need any additional information, please contact me.

Respectfully,

Nathaniel Lewis
Senior Crops and Livestock Specialist
Organic Trade Association (OTA)

cc: Laura Batcha, Executive Director / CEO, OTA

Petition to Remove Lignin Sulfonate at 7 CFR 205.601(l)

Item A

This petition seeks the removal of **LIGNIN SULFONATE** - *As floating agents in postharvest handling* from the National List as a synthetic substance allowed for use in organic crop production under §205.601(l)(1) based on a lack of essentiality.

Note that this petition only addresses the use of lignin sulfonate as a floating agent in postharvest handling as listed in §205.601(l)(1), not as a dust suppressant or chelating agent as listed at §205.601(j)(4) or as an inert ingredient in pesticide products as listed at §205.601(m)(1).

Item B

1. The substance's chemical or material common name.

Lignin sulfonate

Other chemical names for lignin sulfonate are:

- Lignosulfonate
- Lignosulfuric acid
- Lignosulfonic acid
- LST 7
- Ligninsulonic acid
- Poly(lignosulfonic acid)
- Sulfite lignin

Commonly used salts of lignin sulfonate are:

- Sodium lignosulfonate
- Magnesium lignosulfonate
- Ammonium lignosulfonate
- Calcium lignosulfonate

2. The petitioner's name, address and telephone number and other contact information.

The Organic Trade Association
The Hall of the States
444 N. Capitol St. NW. Suite 445A
Washington D.C. 20001
Contact Person: Nathaniel Lewis
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3. The current use of the substance.

The only use of Lignin Sulfonate addressed by this petition to remove is as a floating agent in postharvest handling of products (e.g., pears) (7 CFR 205.601(l)(1)).

Other current uses not applicable to this petition:

Lignin sulfonate is allowed for use in organic crop production as a plant or soil amendment as a dust suppressant and as a chelating agent (7 CFR 205.601(j)(4)).

Calcium lignosulfonate (CAS No. 8061-52-7) and sodium lignosulfonate (CAS No. 8061-51-6) may be used as inert ingredients in pesticide products. These inert ingredients are on EPA's inert ingredients list (List 4B) and are therefore currently allowed for use as inert ingredients in pesticide products.

Even though it is not a "current" use, it should also be noted that there is a petition for the use of lignin sulfonate in aquatic plant production that is still pending. At the Spring 2014 NOSB meeting, it was referred back to Livestock Subcommittee until NOP issues a proposed rule on organic aquaculture standards and NOSB receives additional technical information as needed.

4. Mode of action.

Lignin sulfonate is used as a floatation agent in post-harvest handling of pears and stone fruits (i.e., peaches, nectarines, and apricots). It is added to the float tanks used to remove fruit from the bins in which they are transported to the packing house. As each bin is completely submerged in the float tank, the fruit floats out, thereby eliminating any excessive physical contact which can damage the fruit. However, because pears and stone fruits have approximately the same or higher density as water, they do not float well enough to move out of the bins and through the dump tank. Therefore, some facilities historically added lignin sulfonate to the water in the tank to increase its specific gravity, thereby allowing the fruit to better float.

5. The source of the substance and manufacturing description.

For details on the manufacturing process, please refer to the Technical Evaluation Report prepared in 2011 for the NOSB (Appendix A).

6. A summary of any available previous reviews by State or private certification programs or other organizations of the petitioned substance.

Lignin sulfonate is currently included on the National List as a synthetic substance allowed for use in organic production (7 CFR 205.601). Lignin sulfonate may be used in organic crop production as a plant or soil amendment (dust suppressant or chelating agent) or a flotation agent in postharvest handling (see 7 CFR 205.601(j)(4) and 7 CFR 205.601(l)(1)). Please reference the Technical Advisory Panel Report

Petition to Remove Lignin Sulfonate at 7 CFR 205.601(l)

prepared in 1995 (Appendix B), the Technical Evaluation Report prepared in 2011 (Appendix A) and the Formal Recommendation by the NOSB Crops Committee regarding its Sunset 2012 relisting (Appendix C).

Calcium lignosulfonate (CAS No. 8061-52-7) and sodium lignosulfonate (CAS No. 8061-51-6) may be used as inert ingredients in pesticide products. These inert ingredients are on EPA's inert ingredients list (List 4B) which, in combination with List 4A, was used as a reference for allowed inert ingredients in organic pesticide products.

Some international organizations allow the use of lignin sulfonate in organic food production. The Canadian General Standards Board allows the use of lignin sulfonate as a dust suppressant, formulant ingredient, and chelating agent (Canadian General Standards Board, 2009). The International Federation of Organic Agriculture Movements (IFOAM) includes calcium lignosulfonate on its —Indicative List of Substances for Organic Production and Processing. No other lignin sulfonates are included (IFOAM, 2008). As of 2009, calcium lignosulfonate is allowed by the CODEX Alimentarius Commission as a food additive, and the compound has been assigned INS Number 1522 (Codex Alimentarius Commission, 2010).

Until 2008, lignin sulfonate was not allowed to be used in the production or handling of certified organic products exported to Japan from the United States. In 2008, the Ministry of Agriculture, Forestry, and Fisheries (MAFF) in Japan lifted the ban on lignin sulfonate used as a dust suppressant or chelating agent in organic crop inputs but maintained the ban on lignin sulfonate used in post-harvest handling (i.e. floatation agent for pears and stone fruit). At that time, products exported to Japan were required to have verification that they were handled without lignin sulfonate, be accompanied by an export certificate, and be imported by a JAS- certified importer (USDA, 2009). The restriction on lignin sulfonate as a handling material for organic products exported to Japan was dropped when US/Japan Equivalency Arrangement went into effect (January 1, 2014). Lignin sulfonate is not specifically discussed by the European Union Regulations.

7. Information regarding EPA, FDA, and State regulatory authority registrations, including registration numbers.

Food and Drug Administration

Lignin sulfonate and its salts are cited in several FDA regulations in Title 21, Code of Federal Regulations including §573.600 (Food Additives Permitted in Feed and Drinking Water of Animals), §176.210 (Indirect Food Additives; Defoaming agents used in the manufacture of paper and paperboard), §176.170 (Indirect Food Additives; Components of paper and paperboard in contact with aqueous and fatty foods), and §177.1210 (Indirect Food Additives; Closures with sealing gaskets for food containers).

Environmental Protection Agency

According to 40 CFR §180.900, “An exemption from a tolerance shall be granted when it appears that the total quantity of the pesticide chemical in or on all raw agricultural commodities for which it is useful under conditions of use currently prevailing or proposed will involve no hazard to the public health.”

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Lignin sulfonate and its salts are approved for Food and Nonfood Use and are exempted from the requirement of a tolerance when used in accordance with good agricultural practice as inert (or occasionally active) ingredients in pesticide formulations applied to growing crops or to raw agricultural commodities after harvest and to animals (40 CFR §180.910 and §180.930 respectively).

8. The Chemical Abstracts Service (CAS) number or other product numbers of the substance.

The CAS number for lignin sulfonate is 8062-15-5.

Other codes are:

705707 (USEPA PC Code [U.S. EPA 2010b])

160226 (EPA Reference ID)

705705, 705708–705714 (U.S. EPA PC Code [U.S. EPA, 2010b], various lignosulfonate salts)

1522 (CODEX Alimentarius Commission INS Number, calcium lignosulfonate)

The CAS numbers for commonly used salts of lignin sulfonate are:

8061-51-6 (sodium lignosulfonate)

8061-54-9 (magnesium lignosulfonate)

8061-53-8 (ammonium lignosulfonate)

8061-52-7 (calcium lignosulfonate)

9a. The substance's physical properties

Lignin sulfonate is a solid (commonly sold as a powder or in liquid suspension) that is brown and odorless. For more details on this substance's physical properties, please refer to the Technical Evaluation Report prepared in 2011 for the NOSB (Appendix A).

9b. Chemical mode of action

(a) Chemical interactions with other substances, especially substances used in organic production:

With respect to its use as a floatation agent in the handling of fruit, lignin sulfonates are not compatible with chlorine compounds in the dump tank, since chlorine ions tend to become inactivated by binding with the large carbon-based lignin sulfonate molecules.

(b) Toxicity and environmental persistence:

Lignin sulfonate itself is generally considered to be of relatively low toxicity, except at high doses. However, due to its high biological oxygen demand (BOD) during breakdown in water, lignin sulfonate will remove dissolved oxygen from waterways in amounts that may be harmful to aquatic organisms, therefore care must be taken to ensure it is not discharged to waterways without proper pretreatment.

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(c) **Environmental impacts from its use and/or manufacture:**

The dark brown color from the lignin sulfonate can interfere with UV disinfection systems, causing it to pass through wastewater treatment plants using these systems without being sufficiently treated. Wastewater containing lignin sulfonate discharged into water bodies may cause foaming and discoloration.

(d) **Effects on human health:**

The U.S. EPA issued an exemption from the requirement of a tolerance for lignin sulfonates when they are used as inert ingredients pre- and post-harvest in agricultural production. This exemption is based on the conclusion that there is a ‘...reasonable certainty that no harm will result...’ to the general public, infants, and children from aggregate exposures (includes all dietary, drinking water, and non-occupational exposures) to lignosulfonates.

(e) **Effects on soil organisms, crops, or livestock:**

With respect to lignin sulfonate’s usage as a floating agent in postharvest handling, there is no direct effect on soil organisms, crops, or livestock expected.

For more details on chemical modes of action listed in this section, please refer to the Technical Evaluation Report prepared in 2011 for the NOSB (Appendix A).

10. Safety information about the substance including a Material Safety Data Sheet (MSDS) and a substance report from the National Institute of Environmental Health Studies.

MSDSs for some of the trade name products listed in the Technical Evaluation Report prepared in 2011 for the NOSB are attached in Appendix D.

11. Research information about the substance

Approximately 85% of all pears (organic and conventional) come from the Pacific Northwest. The vast majority of the organic pears produced in the US come from Oregon and Washington. The rest are from California, and there are only two other US facilities that pack organic pears, one in Colorado and one in New Jersey.

As part of a recent outreach project, the Organic Trade Association conducted a poll of all certified organic pear packing facilities in the US. The poll was based upon the NOP list of certified handlers that are certified to pack organic pears and cross referenced with the organic shipper’s list from Pear Bureau NW. Each operation was accounted for either through direct contact by OTA personnel or consult with their ACAs that referenced approved OSPs on file. This research showed that none of these handlers are using lignin sulfonate. They have all either switched to floatless systems that do not use floating agents or, when necessary, are using one of the alternative materials on the National List that may be used as a floating agent (i.e., sodium silicate, sodium carbonate, potassium carbonate).

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12. Petition Justification Statement

This petition requests the removal of lignin sulfonate as a floating agent in postharvest handling (§205.601(l)(1)) as it is no longer essential for organic production.

There are currently four substances on the National List that may be used to float organic pears in post-harvest handling:

- lignin sulfonate (§205.601(l)(1))
- sodium silicate (§205.601(l)(2))
- sodium carbonate (§205.605(a))
- potassium carbonate (§205.605(b))

Informal polling of certifiers and major pear packers currently certified to the USDA organic regulations suggest that organic pear packers whose equipment still require a floating agent use one of the alternative substances rather than lignin sulfonate due, in part, to the substance's incompatibility with chlorine sanitizers.

Approximately twice as much lignin sulfonate as sodium silicate is needed to reach the same specific gravity. Lignin sulfonate is incompatible with chlorine sanitizers and reduces their disinfecting properties. Because lignin sulfonates make very dark solutions, they can interfere with UV disinfection systems and therefore may not be sent to wastewater treatment plants that use these systems.

As the pear industry modernizes its equipment, floating agents are becoming obsolete and new "floatless" packing lines are being installed. In outreach efforts to pear packing facilities that are on the NOP list of certified handlers that are certified to pack organic pears cross referenced with the organic shipper's list from Pear Bureau NW, we found that many packers have upgraded their systems to use floatless dump tanks, therefore no specific gravity enhancing chemicals are required.

This suggests that while floating agents may still be used by some organic pear packers, this use of lignin sulfonate is no longer essential to organic production. It is on this basis that OTA is filing this petition to remove lignin sulfonate from 205.601(l)(1) as a floating agent in post-harvest handling.

13. Confidential Business Information Statement

This petition contains no confidential business information.

Appendices

Petition for removal of LIGNIN SULFONATE from the National List as a synthetic substance allowed for use in organic crop production at §205.601(l) - As floating agents in postharvest handling.

Appendix A – Technical Evaluation Report

Lignin Sulfonate – Crops

February 10, 2011

Appendix B – TAP Reviews

Lignin Sulfonate – Crops

September 1995

Appendix C – National Organic Standards Board Crops Committee

2012 Sunset Proposed Recommendation

Lignin Sulfonate

April 29, 2011

Appendix D – MSDSs for Lignosite®, BorrePlex, Phyto-Plus®

Lignin Sulfonate

Crops

Identification of Petitioned Substance

1			
2			
3	Chemical Names:	28	CAS Numbers:
4	Lignin sulfonate	29	8062-15-5
5		30	Lignosulfonate salts:
6	Other Names:	31	8061-51-6 (sodium lignosulfonate)
7	lignosulfonate	32	8061-54-9 (magnesium lignosulfonate)
8	lignosulfuric acid	33	8061-53-8 (ammonium lignosulfonate)
9	lignosulfonic acid	34	8061-52-7 (calcium lignosulfonate)
10	LST 7	35	(U.S. EPA, 2010a)
11	Ligninsulonic acid		
12	Poly(lignosulfonic acid)		Other Codes:
13	Protectol W		705707 (USEPA PC Code [U.S. EPA 2010b])
14	Sulfite lignin		160226 (EPA Reference ID)
15	(NLM, 2011a)		705705, 705708-705714 (U.S. EPA PC Code [U.S.
16	There are also various salts of lignin sulfonate		EPA, 2010b], various lignosulfonate salts)
17	listed in the CAS Numbers section.		1522 (CODEX Alimentarius Commission INS
18			Number, calcium lignosulfonate)
19	Trade Names:		
20	Lignosite® - Georgia-Pacific (Georgia-Pacific		
21	West, Inc., 2000)		
22	BorrePlex - LignoTech USA, Inc. (OMRI, 2010)		
23	Phyto-Plus® Plant Stimulator - Baicor L.C.		
24	(OMRI, 2010)		
25	SHADOW - LignoTech USA, Inc. (OMRI, 2010)		
26	Orzan - ITT Rayonnier (Sugar and Spotts, 1986)		
27			

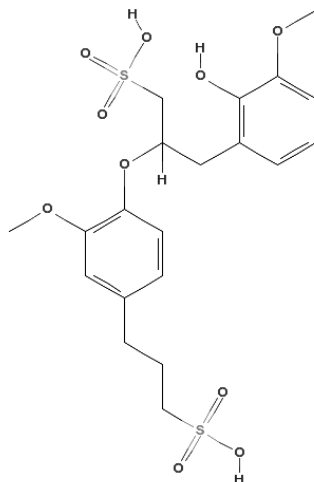
Characterization of Petitioned Substance

Composition of the Substance:

Lignin is a constituent of woody plants that functions as a strengthening element. Lignin sulfonate is a derivative of lignin, where the lignin has been sulfonated in a wood pulping process (Zhor and Bremner, 1999). Lignin sulfonate has the chemical formula $C_{20}H_{26}O_{10}S_2$ (NLM, 2011b) and its structure is presented in Figure 1. However, lignin sulfonate may be composed of a variety of sulfonated aromatic alcohols which make up lignin polymers, including *p*-coumaryl alcohol, sinapyl alcohol, and coniferyl alcohol (FAO, 2008). The lignin molecule is complex and not well understood in spite of its prevalence (Pure Lignin, 2010). The sulfonate complex may be in association with calcium, magnesium, ammonium, or sodium (U.S. EPA, 2010b).

The National List of Allowed and Prohibited Substances (hereafter referred to as the National List) identifies lignin sulfonate as a synthetic substance allowed for use in organic production (7 CFR 205.601). Because the lignin sulfonate molecule is negatively charged, it typically complexes with various cations to form lignin sulfonate salts. Four specific lignin sulfonate salts are included in the Generic Materials List published by the Organic Materials Review Institute (OMRI): sodium lignosulfonate, magnesium lignosulfonate, ammonium lignosulfonate, and calcium lignosulfonate (OMRI, 2010). Although these salts are not specifically named in the National List, this Technical Report provides relevant information about them when available.

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61
62 **Figure 1. Chemical Structure of Lignin Sulfonate (NLM, 2011b)**
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6465 **Properties of the Substance:**
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67 A molecular weight of 490.5 g/mol has been reported for lignin sulfonate (NLM, 2011b). Other reports on
68 the lignin sulfonates as a group state that they may have molecular weights ranging from 1,000 to 20,000
69 daltons, or higher (up to 100,000 daltons in some cases) depending on their composition (Zhor and
70 Bremner, 1999; Hawley, 1981). Weight-average molecular weights of calcium liginosulfonate are reported
71 to range from 40,000 to 65,000 (unitless). Calcium liginosulfonate is soluble in water and insoluble in
72 organic solvents (FAO, 2008).

73
74 Other physical and chemical properties of lignin sulfonate are presented in Table 1. The properties
75 presented in Table 1 describe lignin sulfonate generally, unless a specific salt is otherwise indicated.

76
77 **Specific Uses of the Substance:**
78

79 Lignin sulfonate may be used in organic crop production as a plant or soil amendment (dust suppressant,
80 chelating agent) and a floatation agent for postharvest handling of products (e.g., pears). Chelating agents
81 are large, organic molecules that are used to envelop highly-reactive trace metal ions. The purpose of
82 chelates is to incorporate metal ions into a soluble but bound form that is capable of supplying nutrients to
83 plants. As the chelate breaks down, the metal ion micronutrients are slowly released into the soil in a
84 bioavailable form that may be taken up by the plant (Jones and Jacobsen, 2009). Two manufacturers
85 produce products containing lignin sulfonate—LignoTech USA, Inc. and Baicor, L.C. (OMRI, 2010).
86 LignoTech manufactures five products and Baicor, L.C. manufactures one product (OMRI, 2010).

87
88 Lignin sulfonates have also been investigated for their potential as chelating agents for the complexation of
89 metal ions, including copper, magnesium, and mercury, for the purpose of environmental remediation.
90 Garcia-Valls et al. (2001) cited the biodegradability and relatively inexpensive nature of the lignin
91 sulfonates as factors supporting their use in remediation. Lignin sulfonates have also been used in
92 bioremediation at dairy operation facilities and meat and seafood canneries. Lignin sulfonates were
93 applied to waste streams at the facilities to help remove dairy and seafood waste. The lignin sulfonates
94 formed complexes with the waste materials, which then precipitated out of wash solutions. This process
95 allowed for diversion of some food waste from waterways. The resulting food waste/lignin sulfonate
96 complex was then used in animal feed (USDA, 1969).
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Table 1. Chemical Properties of Lignin Sulfonate

Chemical or Physical Property	Value
Color	Light tan to dark brown*†† (CAMEO, Undated-a; CAMEO, Undated-b)
Physical State	Solid (powder) (Hawley, 1981)
Odor	Odorless (CAMEO, Undated-a)
Melting Point	Decomposes at >200°C (>392°F) (Hawley, 1981)
Boiling Point	Exists in a solid state
Solubility	Soluble in water† (FAO, 2008)
Stability	Soil half-life up to one year depending on chemical species and soil flora*† (Selin et al., 1975)
Reactivity	Lignin sulfonates are corrosive to aluminum and aluminum alloys in the absence of calcium carbonate (CPWA, 2005)
Oxidizing or Reduction Action	React as acids to neutralize bases. Usually do not react as reducing or oxidizing agents (CAMEO, Undated-a)‡
Flammability/Flame Extension	Flash point data not available although probably combustible (CAMEO, Undated-a)‡
Explosibility	Dust explosions may occur if fine particles are mixed with air in the presence of an ignition source. Ignition temperature is approximately 250–300°C (482–572°F) * (Georgia-Pacific West, Inc., 2000)

*Sodium lignosulfonate

‡Ammonium lignosulfonate

†Calcium lignosulfonate

100
101 Calcium lignosulfonate may be used as an inert ingredient or adjuvant (mixing agent/sticking aid) in
102 pesticide products, except for those exempt under Section 25(b) of the Federal Insecticide, Fungicide, and
103 Rodenticide Act (FIFRA)¹ (OMRI 2010; CFR, 2003a; CFR, 2003b; CFR, 2003c). Calcium lignosulfonate is
104 also used as an encapsulating agent or carrier for fat-soluble carotenoids, vitamins, and other functional
105 ingredients in foods such as vitamin drinks, fruit-based beverages, hard candies, and dairy products
106 (Toledo and Kuznesof, 2008). As discussed in the “Composition of the Substance” section, other lignin
107 sulfonate salts are included in the OMRI Generic Materials List (OMRI 2010), but little specific information
108 is available about them.

109
110 **Approved Legal Uses of the Substance:**
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112 Lignin sulfonate is currently included on the National List as a synthetic substance allowed for use in
113 organic production (7 CFR 205.601). Lignin sulfonate may be used in organic crop production as a plant or
114 soil amendment (dust suppressant, chelating agent, or floatation agent) or a flotation agent in postharvest
115 handling (see 7 CFR 205.601(j)(4) and 7 CFR 205.601(l)(1)). The OMRI generic materials list includes the
116 following lignin sulfonate salts: sodium lignosulfonate, magnesium lignosulfonate, ammonium
117 lignosulfonate, and calcium lignosulfonate (OMRI, 2010). These lignosulfonate salts are not specifically
118 identified on the National List.

119
120 Calcium lignosulfonate (CAS No. 8061-52-7) and sodium lignosulfonate (CAS No. 8061-51-6) may be used
121 as inert ingredients in pesticide products. These inert ingredients are on EPA’s inert ingredients list (List
122 4B) which, in combination with List 4A, was used as a reference for allowed inert ingredients in organic
123 pesticide products. In 2006, EPA changed its classification system for inert ingredients, but lists 4A and 4B
124 are still maintained for their use by the NOP. The NOP still allows inert ingredients on these lists to be
125 used as inert ingredients in pesticide products unless the ingredients were removed following EPA

¹ FIFRA is the federal law that regulates pesticide products in the United States and is administered by the U.S. EPA.

126 reassessment. Calcium lignosulfonate and sodium lignosulfonate have not been removed from the EPA
127 List 4B and are therefore allowed for use as inert ingredients in pesticide products (NOSB, 2009).

128
129 Ammonium lignosulfonate is allowed, with restrictions, for use as a nutrient chelate in organic fertilizer
130 products. Formulated fertilizer products that contain ammonium lignosulfonate may not make nitrogen
131 claims on the label and/or the contribution of ammonium lignosulfonate to the total nitrogen content of
132 the formulated product must be less than 1percent (OMRI 2010; CFR, 2003a; CFR, 2003b; CFR, 2003c).
133 Lignin sulfonate is exempt from the requirement of a tolerance when used as an inert ingredient in pre-
134 and post-harvest agricultural production and as an inert ingredient applied to animals (CFR, 2004a; CFR,
135 2004b). Tolerances are acceptable levels of pesticide residues on food products that are set by the U.S. EPA,
136 and enforced by the USDA and FDA. According to 40 CFR 180.900, "An exemption from a tolerance shall
137 be granted when it appears that the total quantity of the pesticide chemical in or on all raw agricultural
138 commodities for which it is useful under conditions of use currently prevailing or proposed will involve no
139 hazard to the public health."

140 **Action of the Substance:**

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142 Lignin sulfonate acts as a dust suppressant by its large size and affinity for binding with other polar and
143 nonpolar compounds. The smaller dust compounds adsorb to the lignin sulfonate and form a larger,
144 heavier complex that is not as friable, which suppresses the dust (CWPA, 2005). Lignin sulfonate is used as
145 a micronutrient chelate because it is a large compound with multiple polar and nonpolar moieties. The
146 relatively smaller, charged micronutrient ions, such as boron, manganese, and iron, are bound to the large
147 lignin sulfonate molecule and are slowly released into the soil in a bioavailable form (Jones and Jacobsen,
148 2009). Lignin sulfonate will help stabilize emulsions by acting as a surfactant. Lignin sulfonate dissolved
149 in water is mixed with oil and preferentially adsorbs to the oil molecules, forming a barrier at the interface
150 between the oil and water, which stabilizes the emulsion (Gundersen and Sjoblom, 1999; LignoTech, 2009).
151 When used as a flotation aid, lignin sulfonate is added to the dump water to increase the density of the
152 water. This is necessary for fruits like pears that may be heavier than water. Increasing the density of the
153 water with lignin sulfonate allows the pears to float, and therefore the pears are less likely to be damaged
154 in processing (Agar and Mitcham, 2000).

155 **Combinations of the Substance:**

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157 Through its use as an emulsifier and adjuvant, lignin sulfonates (calcium lignosulfonate and sodium
158 lignosulfonate) may be combined with various pesticide active ingredients that act as insecticides or
159 herbicides (NOSB, 2009; OMRI, 2010; CFR, 2003a; CFR, 2003b; CFR, 2003c).

163 Status

164 **Historic Uses:**

165
166 Lignin sulfonate has been used in organic agricultural production as a dust suppressant, chelating agent
167 for micro- and macronutrient fertilizer applications, flotation agent in pear production, and as an
168 emulsifier and stabilizer for pesticide applications. A previous technical report for lignin sulfonate was
169 created as part of the 1995 petition process to add lignin sulfonate to the National Organic Standards Board
170 (NOSB) National List (NOSB, 1995).

171
172 Lignin sulfonate has been investigated for its potential as a chelating agent in the environmental
173 remediation of heavy metals and in the remediation of food processing wastes (Garcia-Valls et al., 2001;
174 USDA, 1969). Lignin sulfonate also has been used as an encapsulating agent for vitamins and other
175 ingredients in food products (Toledo and Kuznesof, 2008).

176
177

178 Lignosulfonates have a variety of industrial applications. One of the main applications of lignosulfonates
179 is in the concrete industry, where they may be used as dispersing agents and to delay the setting of
180 concrete. In other industries, they may be used as additives in oil well drilling, dispersants for dyestuffs,
181 cleaning agents, and as a partial substitute for phenol in the manufacture of adhesives. Sodium
182 lignosulfonate is potentially useful in inhibiting corrosion and scale formation in recirculating cooling
183 water systems (Ouyang et al., 2006).

184

185 OFPA, USDA Final Rule:

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187 Lignin sulfonate is included within the scope of the Organic Foods Production Act of 1990 by implied
188 inclusion in the group, "...an active synthetic ingredient in the following categories: copper and sulfur
189 compounds..."

190

191 Lignin sulfonate is explicitly identified in the National List in 7 CFR Section 205, as follows:

192

- 193 • 205.601(j)(4) - Lignin sulfonate - chelating agent, dust suppressant, floatation agent

194

- 195 • 205.601(l) - As floating agents in postharvest handling; (1) Lignin sulfonate

196

197 International:

198

199 Some international organizations allow the use of lignin sulfonate in organic food production. The
200 Canadian General Standards Board allows the use of lignin sulfonate as a dust suppressant, formulant
201 ingredient, and chelating agent (Canadian General Standards Board, 2009).

202

203 The International Federation of Organic Agriculture Movements (IFOAM) includes calcium lignosulfonate
204 on its "Indicative List of Substances for Organic Production and Processing." No other lignin sulfonates
205 are included (IFOAM, 2008). As of 2009, calcium lignosulfonate is allowed by the CODEX Alimentarius
206 Commission as a food additive, and the compound has been assigned INS Number 1522 (Codex
207 Alimentarius Commission, 2010).

208

209 Until 2008, lignin sulfonate was not allowed to be used in the production of certified organic products
210 exported to Japan from the United States. In 2008, the Ministry of Agriculture, Forestry, and Fisheries
211 (MAFF) in Japan lifted the ban of lignin sulfonate on crops imported to Japan. However, the products
212 containing lignin sulfonate must be accompanied by an export certificate and must be imported by a JAS-
213 certified importer (USDA, 2009). Lignin sulfonate is not specifically discussed by the European Economic
214 Community Council Regulations.

215

216

Evaluation Questions for Substances to be used in Organic Crop or Livestock Production

217

218 **Evaluation Question #1:** What category in OFPA does this substance fall under: (A) Does the substance
219 contain an active ingredient in any of the following categories: copper and sulfur compounds, toxins
220 derived from bacteria; pheromones, soaps, horticultural oils, fish emulsions, treated seed, vitamins and
221 minerals; livestock parasiticides and medicines and production aids including netting, tree wraps and
222 seals, insect traps, sticky barriers, row covers, and equipment cleansers? (B) Is the substance a synthetic
223 inert ingredient that is not classified by the EPA as inert of toxicological concern (i.e., EPA List 4 inert)
224 (7 U.S.C. § 6517(c)(1)(B)(ii))? Is the synthetic substance an inert ingredient which is not on EPA List 4,
225 but is exempt from a requirement of a tolerance, per 40 CFR part 180?

226

227 (A). Lignin sulfonate is listed by inference as part of the group, "copper and sulfur compounds" in the
228 OFPA, Section 2118 (c)(1)(B)(i).

229

230 (B). Lignin sulfonate is a synthetic inert ingredient that is not classified by EPA as an inert of
231 toxicological concern. Lignin sulfonate (and the lignosulfonate salts) are exempt from the
232 requirement of a tolerance under 40 CFR parts 180.910 and 180.930.
233

234 **Evaluation Question #2: Describe the most prevalent processes used to manufacture or formulate the**
235 **petitioned substance. Further, describe any chemical change that may occur during manufacture or**
236 **formulation of the petitioned substance when this substance is extracted from naturally occurring plant,**
237 **animal, or mineral sources (7 U.S.C. § 6502 (21)).**
238

239 Lignin sulfonates are produced from the process of sulfite chemical pulping. Sulfite pulping involves
240 cooking softwood chips under pressure in sulfur dioxide-containing cooking liquors. When the cooking
241 process is complete, sulfonated lignin is collected as a liquid by-product in the spent liquor, while the pulp
242 is used for paper production. The lignin sulfonates that result from the spent liquor of the sulfite pulping
243 process must be further purified to remove excess sugars. This is done by fermentation of the liquor,
244 followed by heating to remove the alcohol generated. The resulting lignin sulfonate polymers can have
245 high molecular weights ranging from less than 1,000 to more than 100,000 daltons (Zhor and Bremner,
246 1999; Westvaco Corp., 1987).
247

248 Lignin sulfonates may also be obtained from the Kraft pulping process; these are referred to as Kraft
249 lignins. Kraft pulping is similar to sulfite pulping, but involves treating the wood at high temperature and
250 pressure in a water solution containing sodium sulfide and sodium hydroxide. This process dissolves
251 lignin into a soluble salt which dissolves in the pulping liquor. The lignin is removed by precipitation from
252 the liquor using carbon dioxide (CO₂). The Kraft lignins must then be sulfonated after extraction by
253 reacting the material with bisulfate or a sulfite compound (Gundersen and Sjoblom, 1999; U.S. EPA, 1990).
254

255 A third pulping process, acid sulfite pulping, is similar to Kraft pulping, but different chemicals are used.
256 Sulfurous acid, used in place of sodium hydroxide, is combined with sodium, magnesium, calcium, or
257 ammonium bisulfite. After the cooking is complete, the pulp is separated from the spent liquor, which
258 may then be treated to obtain various chemical materials (U.S. EPA, 1990).
259

260 **Evaluation Question #3: Is the substance synthetic? Discuss whether the petitioned substance is**
261 **formulated or manufactured by a chemical process, or created by naturally occurring biological**
262 **processes (7 U.S.C. § 6502 (21)).**
263

264 Lignin exists naturally in all woody plants as a structural and strengthening component. Because lignin is
265 integrated into the plant cell wall, there are no natural processes that liberate lignin other than natural
266 decomposition of wood by microorganisms. Lignin sulfonates are produced from the application of
267 pressure and heat to wood in the presence of sulfur dioxide or by the addition of alkali and various acids
268 and sulfates, as described under Evaluation Question #2. These are not naturally-occurring processes.
269 Therefore, lignin sulfonates are synthetic (U.S. EPA, 1990; Gundersen and Sjoblom, 1999).
270

271 **Evaluation Question #4: Describe the persistence or concentration of the petitioned substance and/or its**
272 **by-products in the environment (7 U.S.C. § 6518 (m) (2)).**
273

274 Lignosulfonates discharged into water bodies may cause foaming and discoloration. Due to their high
275 biological oxygen demand (BOD) during breakdown in water, lignosulfonates will remove dissolved
276 oxygen from waterways in amounts that may be harmful to aquatic organisms (CPWA, 2005). Little
277 additional information is available in the published literature on the degradation pathways for
278 lignosulfonates in water.
279

280 The half-life of lignosulfonates in soil, as evidenced by the loss of sulfates or sulfonic acid groups, is up to
281 one year. Soil microorganisms, enzymatic reactions, and ultraviolet (UV) radiation contribute to the
282 breakdown of lignosulfonates. The structure of lignosulfonates may be altered by wood-rotting fungi, with

283 polymerization being the main pathway, based on a decrease in phenolic hydroxyl groups (Selin et al.,
284 1975). Laccase, an enzyme produced by fungi, increased degradation of lignosulfonates to low-molecular
285 weight fractions under laboratory conditions (Cho et al., 2004). In addition to microbial decomposition,
286 enzymatic oxidative reactions contribute to the early breakdown process of lignosulfonates. Light (UV
287 radiation) also hastens the degradation of lignosulfonates by creating radicals capable of degrading the
288 lignosulfonate molecular structure. This breakdown process yields lower molecular weight lignosulfonate
289 fragments and CO₂. The CO₂ may account for 15–20% of the original organic carbon. As lignosulfonates
290 degrade, they become more susceptible to further degradation by microbial populations. Due to the
291 complex and heterogeneous structures of lignosulfonates, detailed information about breakdown products
292 is difficult to describe (Lauten et al., 2010). Given that lignin is a naturally-occurring component of wood,
293 once the sulfonic acid groups have been cleaved, the lignin that remains would likely be broken down in a
294 manner very similar to that of rotting wood.

295

296 **Evaluation Question #5: Describe the toxicity and mode of action of the substance and of its**
297 **breakdown products and any contaminants. Describe the persistence and areas of concentration in the**
298 **environment of the substance and its breakdown products (7 U.S.C. § 6518 (m) (2)).**
299

300

301 Sodium lignosulfonate is relatively low in toxicity based on results of tests in laboratory animals, including
302 rats, rabbits, and guinea pigs (Luscombe and Nicholls, 1973; Marcus and Watts, 1974). However, high
303 doses of sodium lignosulfonate have been found to cause adverse health effects in laboratory animals. Rats
304 that were given drinking water containing purified sodium lignosulfonate at a 10 g/100 ml concentration
305 for 16 weeks had skin lesions at the bases of their tails, decreased weight gain, increased leukocyte counts,
306 and increased kidney, spleen, and liver weights (Luscombe and Nicholls, 1973). In a study with guinea
307 pigs and rabbits administered sodium lignosulfonate at a 1 percent concentration for a two- to six-week
308 period, a high percentage of the animals developed ulcerative colon disease (Marcus and Watts, 1974). A
309 median lethal oral dose of greater than 40 g/kg has been reported for rats (Luscombe and Nicholls, 1973).
310 This dose corresponds to the U.S. EPA Toxicity Category IV for oral exposure (greater than 5000 mg/kg),
311 which is the lowest toxicity category (U.S. EPA, 2007).

312

313 Results of a 28-day oral toxicity study in which calcium lignosulfonate was incorporated into the diet of
314 rats at target doses of 0, 500, 1500, or 4000 mg/kg body weight per day showed no observed adverse effects
315 other than chronic inflammation of the rectum at the highest dose level (4000 mg/kg-day). The no-
316 observed-adverse-effect level (NOAEL) from this study was identified as 1300 and 1350 mg/kg-day for
317 males and females, respectively (Munro and Baines, 2009).

318

319 In a 90-day study with Wistar rats dosed with calcium lignosulfonate in the diet at target doses of 0, 500,
320 1000, and 2000 mg/kg-day, the rats showed no adverse clinical signs or organ weight changes following
321 complete pathological evaluations. Test results for primary immune response in the rats were normal. The
322 only observed adverse effect was a dose-related increase in the incidence of histiocytosis (abnormal
323 increase in the number of immune cells) of the mesenteric lymph nodes in male and female rats, with no
324 observed histiocytosis in other lymph tissues. The Joint FAO/WHO Committee reviewed the finding of
325 histiocytosis and concluded that it does not represent an adverse effect, based on findings with other
326 compounds with similar properties (Munro and Baines, 2009).

327

328 No evidence of genotoxicity was found for calcium lignosulfonate in *Salmonella typhimurium* and *Escherichia*
329 *coli* assays, and in a test for chromosomal aberration in Chinese hamster cells. No developmental effects
330 were found in a study with calcium lignosulfonate and pregnant female Wistar rats. The no-observed-
331 effect level (NOEL) for reproductive effects was identified as 1000 mg/kg-day (Munro and Baines, 2009).

332

333 Lignin sulfonates are soluble in water, so it is possible for dissolved lignosulfonates to enter waterways
334 through direct contamination or soil runoff. Lignosulfonates in water may be toxic to fish. A 48-hour LC₅₀
335 of 7,300 parts per million (ppm) was observed by Roald (1977) for rainbow trout. As lignosulfonates break
down in water, they consume dissolved oxygen in the water due to their high BOD, which may adversely

336 affect aquatic organisms through a decrease in available oxygen (CPWA, 2005; Jones and Mitchley, 2001).
337 Due to the acidic pH of lignosulfonates, large spills to waterways may also affect pH of waterways.
338

339 In the previous technical report (NOSB, 1995), a letter from the petitioner addresses concerns with dioxin as
340 a contaminant from the process of paper pulping. Dioxin is a highly-toxic contaminant that is considered a
341 likely human carcinogen (U.S. EPA, 2010c). The petitioner noted that dioxins are generally associated with
342 the Kraft pulping process, and that dioxins are produced as part of pulp bleaching. The petitioner
343 (Western Chemicals) noted that the Georgia-Pacific Corp. generates its lignosulfonates using the bisulfite
344 pulping process (NOSB, 1995). The petitioner also explained that the sulfite liquor, which contains the
345 lignosulfonates, is removed from the pulp before the bleaching process; thus, it is not likely that dioxins
346 would be found in the lignosulfonates generated from this process (NOSB, 1995). In addition, the
347 petitioner reported that they had analyzed their lignosulfonate products for dioxins and furans, and have
348 not detected the contaminants in their lignosulfonate products above the level of detection (NOSB, 1995).
349

350 Georgia-Pacific Lignosite® 100, 260, 431-H, and 458 have been classified as biodegradable, with a hazardous
351 decomposition product of sulfur dioxide (SO₂), which can adversely affect the respiratory system (Ash and
352 Ash, 2004; U.S. EPA, 2011b). Selin et al. (1975) commented on the recalcitrant (resistant to degradation)
353 nature of lignosulfonates, but also showed that many wood-decomposing microbes could break down
354 lignosulfonates. As described in the Action of the Substance section, lignin sulfonates bind strongly to
355 smaller particles in the soil or water. Once adsorbed to the soil, lignosulfonates will be degraded by soil
356 microorganisms. Lignosulfonates may persist for six months to one year when used for dust suppression
357 before they break down (CPWA, 2005; Selin et al., 1975).
358

359 **Evaluation Question #6: Describe any environmental contamination that could result from the**
360 **petitioned substance's manufacture, use, misuse, or disposal (7 U.S.C. § 6518 (m) (3)).**
361

362 Manufacture: Spent sulfite liquors from the paper pulping process contain lignin sulfonate. Before the
363 widespread use of lignin sulfonates, these liquors were treated as waste from the sulfate pulping process
364 and discarded or burned for energy recovery. Given that lignin sulfonate is recovered from waste
365 products of the paper pulp industry after manufacture, the likelihood of environmental contamination
366 from its manufacture is reduced. However, there is still the possibility that spills of effluent from paper
367 pulping operations could contribute large amounts of lignin sulfonate to soils, nearby waterways, or
368 environmentally-sensitive areas.
369

370 Use: Lignin sulfonates used as dust suppressants or in chelates applied as plant nutrients to the soil may
371 contaminate waterways via runoff following a rain event. The primary concern regarding lignin sulfonates
372 in waterways is their high BOD upon decomposition. This causes removal of dissolved oxygen from the
373 water and impacts aquatic organisms (CPWA, 2005).
374

375 Misuse: Dust explosions may occur if finely-divided lignin sulfonate is mixed with air in the presence of
376 an ignition source. Excessive accumulation of dust should be avoided to help prevent explosions (Georgia-
377 Pacific West, Inc., 2000). Decomposition of lignin sulfonate can release SO₂, which is an eye and airway
378 irritant (Sullivan and Krieger, 1992; Georgia-Pacific West, Inc., 2000). Excessive amounts of lignin sulfonate
379 applied to roads for dust suppression or large amounts applied just prior to rainfall events may increase
380 the potential for lignin sulfonate to runoff to waterways.
381

382 Disposal: Lignin sulfonate-treated dump water for pear processing may need to be processed in a
383 treatment system before its disposal. The goal for treatment of these waters is reduction in BOD to a level
384 that does not impact aquatic life (McLellan and Padilla-Zakour, 2005). Untreated dump water could
385 adversely affect aquatic organisms by competing for dissolved oxygen. In the case of spills or accidents
386 involving lignin sulfonate, the area should be washed with water to dilute the spill (Georgia-Pacific West,
387 Inc., 2000). To the extent possible, care should be taken to ensure that wastewater does not flow directly to
388 water bodies. For spills, waste disposal methods include customary procedures for industrial waste
389 treatment (Georgia-Pacific West, Inc., 2000). Spills or releases of lignin sulfonate are not subject to the

390 reporting requirements of the Federal Superfund Amendments and Reauthorization Act (SARA) of 1986
391 (Georgia-Pacific West, Inc., 2000).

392
393 Other: Lignin sulfonates have been investigated for their potential role as chelating agents for the
394 complexation of metal ions, including copper, magnesium, and mercury, for the purpose of environmental
395 remediation. The biodegradability and relatively inexpensive nature of the lignin sulfonates were cited as
396 factors that support their use in remediation (Garcia-Valls et al., 2001). In a report on lignin and its uses by
397 USDA, lignosulfonates were discussed as treatments for food waste from milk processing plants and meat
398 or fish canneries. The lignosulfonate complexes form a precipitate which was then added to animal feed.
399 This application prevented some of the food waste from these operations from entering waterways (USDA,
400 1969).

401
402 **Evaluation Question #7: Describe any known chemical interactions between the petitioned substance**
403 **and other substances used in organic crop or livestock production or handling. Describe any**
404 **environmental or human health effects from these chemical interactions (7 U.S.C. § 6518 (m) (1)).**
405

406 Lignin sulfonates are intended to be used as chelating agents for plant nutrients, dust suppressants, and
407 emulsifiers. By virtue of their intended use, chemical interactions of lignin sulfonates with other
408 substances would be expected. However, lignin sulfonates are generally nonreactive by nature. When
409 used as emulsifiers, lignin sulfonates keep chemical mixtures dispersed in solution by limiting interaction
410 between the two constituents of the mixture (Gundersen and Sjoblom, 1999). When lignin sulfonates come
411 into contact with small soil particles through their use as dust suppressants or chelating agents, the soil
412 particles are adsorbed to the lignin sulfonate due to the presence of polar and non-polar areas on the
413 surface of the lignin molecule. These interactions do not generally result in chemical change but are mostly
414 limited to a physical binding and adsorption. The exception to this is the corrosion of aluminum and its
415 alloys by lignin sulfonates when the material is used as a dust suppressant. This reactivity is of concern
416 due to the prevalence of aluminum or alloy wheels, which can be corroded by the lignin sulfonate as cars
417 with this type of wheel drive over treated roads. Mixing the lignin sulfonate with calcium carbonate in
418 slurry neutralizes the acidic lignin sulfonate and decreases the reaction with aluminum (CPWA, 2005).

419
420 Information on environmental or human health effects from chemical interactions with lignin sulfonate
421 was not available. As a chelating agent, lignin sulfonates could serve to reduce environmental health
422 effects and potential toxicity to humans from exposure to the free metal ions (Garcia-Valls et al., 2001). The
423 biodegradability and relatively inexpensive nature of the lignin sulfonates were cited as factors supporting
424 their use in remediation (see Specific Uses and Historic Use sections and the response to Evaluation
425 Question #6).

426
427 **Evaluation Question #8: Describe any effects of the petitioned substance on biological or chemical**
428 **interactions in the agro-ecosystem, including physiological effects on soil organisms (including the salt**
429 **index and solubility of the soil) crops, and livestock (7 U.S.C. § 6518 (m) (5)).**
430

431 Lignin sulfonates break down by physical or microbiological processes, but may persist in the soil up to
432 one year. Lignin sulfonates are unlikely to accumulate in soil unless they are applied very frequently.
433 Breakdown of lignin sulfonate occurs in part because lignin sulfonate is used as a carbon source by a
434 variety of wood-decaying microorganisms. It is therefore likely that large amounts of lignin sulfonate
435 applied to soils could stimulate soil microbial activity.

436
437 When lignin sulfonate decomposes in soil, sulfates, sulfonic acid groups, and CO₂ are liberated (Selin et al.,
438 1975). The breakdown of a large amount of lignin sulfonate in the soil (resulting in the release of additional
439 CO₂) could acidify the soil (CO₂ forms carbonic acid in the presence of water). Changes in pH due to the
440 addition of large amounts lignin sulfonate could adversely affect plants and soil organisms, but these
441 effects have not been quantified in the published literature.

442

443 Lignin sulfonate, usually as ammonium lignin sulfonate, is deliberately applied to soils when formulated
444 as part of a plant micronutrient chelate. Micronutrient chelates, as described in the Specific Uses section,
445 are large organic molecules used to envelop trace nutrient ions in a bound, but available form that is
446 capable of providing nutrients to the plant while keeping the nutrient ions from forming insoluble
447 complexes with other molecules in the soil (Jones and Jacobsen, 2009). Baicor, Inc. markets a product
448 containing lignin sulfonates (chemical species not identified) called Plant Stimulator™ “Buffer.” The
449 manufacturer claims that this product is also intended to stabilize soils, but does not describe how the
450 product does this or what “stabilize soils” specifically means (Baicor, 2011).

451
452 When lignin sulfonates are discharged to waterways, their decomposition removes dissolved oxygen from
453 water. The lack of dissolved oxygen is harmful to aquatic organisms and, depending on the amount of
454 lignin sulfonates that is discharged, can have a negative impact on aquatic organisms to varying degrees.
455 Lignosulfonates are corrosive to aluminum and aluminum alloys in the absence of calcium carbonate. If
456 the corrosion of aluminum or its alloys occurs as a result of lignosulfonate application to roadways, then
457 contamination of nearby waterways with the corrosion products could result. If the lignosulfonate is
458 applied with calcium carbonate in slurry, the effect is neutralized (CPWA, 2005).

459
460 **Evaluation Question #9: Discuss and summarize findings on whether the petitioned substance may be**
461 **harmful to the environment (7 U.S.C. § 6517 (c) (1) (A) (i) and 7 U.S.C. § 6517 (c) (2) (A) (i)).**

462
463 As discussed in Evaluation Questions #4 and #6, lignin sulfonates used as dust suppressants or in chelates
464 applied as plant nutrients to the soil may contaminate waterways via runoff following a rain event. When
465 used as a flotation aid for dump tanks in pear processing, lignin sulfonates may be discharged to
466 waterways due to improper disposal of the dump water (normal disposal would require treatment of the
467 processing water before disposal). Accidental spills of lignin sulfonate may also result in contamination of
468 waterways. Lignin sulfonates readily dissolve in water (forming acids) and may decrease the pH of waters
469 they contaminate. The severity of this effect will depend on the amount discharged and the characteristics
470 of the receiving water body. Due to their high BOD during decomposition, lignosulfonates will remove
471 dissolved oxygen from waterways in amounts that may adversely affect aquatic organisms such as fish or
472 aquatic invertebrates (CPWA, 2005).

473
474 As discussed above for Evaluation Question #8, lignin sulfonates decompose by physical or
475 microbiological processes, but may persist in the soil in varying amounts at up to one year. However,
476 significant amounts of lignin sulfonates are unlikely to accumulate in agricultural soils unless they are
477 applied frequently.

478
479 Lignin sulfonate may be applied to control road dust. If these applications are frequent and are made
480 during very dry periods, it may lead to an accumulation of lignin sulfonates in the road bed. Runoff flows
481 along the ground surface could transfer the accumulated lignin sulfonate to nearby terrestrial systems or
482 waterways. Large amounts of lignin sulfonates in agricultural soils could cause a decrease in pH (due to
483 decomposition of lignin sulfonate, release of carbon dioxide and sulfur dioxide, and formation of acids)
484 (see Evaluation Question #8). The acidification of the soil could adversely affect crops and soil
485 microorganisms depending on the extent of acidification.

486
487 **Evaluation Question #10: Describe and summarize any reported effects upon human health from use of**
488 **the petitioned substance (7 U.S.C. § 6517 (c) (1) (A) (i), 7 U.S.C. § 6517 (c) (2) (A) (i) and 7 U.S.C. § 6518**
489 **(m) (4)).**

490
491 The U.S. EPA issued an exemption from the requirement of a tolerance for lignin sulfonates when they are
492 used as inert ingredients pre- and post-harvest in agricultural production. This exemption is based on the
493 conclusion that there is a “...reasonable certainty that no harm will result...” to the general public, infants,
494 and children from aggregate exposures (includes all dietary, drinking water, and non-occupational
495 exposures) to lignosulfonates, as defined by the Federal Food, Drug, and Cosmetic Act (FFDCA) and the
496 Food Quality Protection Act of 1996 (FQPA) (U.S. EPA, 2011a; Federal Register, 2005).

497

498 **Evaluation Question #11: Describe all natural (non-synthetic) substances or products which may be**
499 **used in place of a petitioned substance (7 U.S.C. § 6517 (c) (1) (A) (ii)). Provide a list of allowed**
500 **substances that may be used in place of the petitioned substance (7 U.S.C. § 6518 (m) (6)).**

501

502 Pear Flotation: No information was available on natural substances that may be used in place of the
503 petitioned substance for pear flotation. Information was available on allowed synthetic alternatives to the
504 petitioned substance, as summarized below.

505

506 As discussed in the Action of the Substance section, materials used to increase the specific gravity of dump
507 water and provide flotation for pear include sodium silicate, sodium sulfate and sodium carbonate (Sugar
508 and Spotts, 1989). Sodium silicate is an allowed synthetic substance for organic production that can be
509 used (with restrictions) as a floating agent in postharvest handling of fruit (NOSB, 1995). Sodium sulfate is
510 allowed for use in organic agriculture, but only as a livestock feed ingredient or in livestock healthcare
511 (OMRI, 2010). Sodium carbonate is allowed for use in organic agriculture for processing non-agricultural
512 ingredients and processing aids, as a crop fertilizer and soil amendment, and as a livestock feed ingredient
513 (OMRI, 2010). There are no fruit processing or flotation uses described for sodium carbonate.

514

515 According to a survey from 1998 of pear packers in the western U.S., about 70 percent of packing houses
516 used a form of lignin sulfonate for pear flotation (Sugar, 2002). However, a major source of lignin sulfonate
517 in the Pacific Northwest closed prior to 2001, forcing growers to evaluate other alternatives for flotation
518 (Sugar, 2002). Two new products were evaluated in 2001 by researchers at Oregon State University – K-
519 Float (potassium carbonate) and Xeda F (potassium phosphate and potassium pyrophosphate) – along with
520 sodium carbonate, calcium chloride, and sodium sulfate for their use in pear flotation. These products
521 were evaluated at the Southern Oregon Research and Extension Center in Medford, OR, and the findings
522 were reported at the Washington Tree Fruit Postharvest Conference on March 12th and 13th, 2002, in
523 Yakima, WA. All tested products performed in a manner similar to lignin sulfonate to raise the density of
524 water in dump tank solutions and allow pears to float for easier and less-damaging processing. When used
525 in combination with Steri-Seal (an antimicrobial agent) the “relatively low” pH solutions containing Xeda
526 F, calcium chloride, and sodium sulfate were more likely to cause fruit burn than the “relatively high” pH
527 solutions including lignin sulfonate, sodium carbonate, and K-Float (Sugar, 2002). Fruit burn is caused in
528 part by the increased availability of phenol that occurs at lower pH. For higher pH solutions, more Steri-
529 Seal had to be added to dump tanks to prevent fruit infection (Sugar, 2002). In practice, multiple materials
530 may be mixed at varying percentages in order to achieve the desired decrease in fruit injury and infection
531 rates (Sugar, 2002). In these tests, a mixture of Xeda F with Steri-Seal disinfectant at 1percent provided the
532 lowest gray mold infection rate (12 percent). However, all of the alternate treatments caused some degree
533 of fruit injury at increased dump tank temperature. The exception to the rule was lignin sulfonate, which
534 was found to lower pH levels, but also have a “safening” property for phenol injury at a low pH (Sugar,
535 2002).

536

537 Dust Suppression: Magnesium chloride and calcium chloride from nonsynthetic sources are allowed for
538 use as a dust suppressant under certain circumstances (NOSB, 1995). Magnesium chloride from synthetic
539 sources is allowed for use in organic agriculture for dust suppression only if it is derived from seawater
540 (NOSB, 1995). Synthetic calcium chloride is allowed for use only as a livestock feed ingredient or in
541 livestock healthcare (NOSB, 1995). “Plant Extracts” are listed in the NOP rule (205.105), but no dust-
542 suppressant plant extract products were identified.

543

544 Chelating Agent: Nonsynthetic amino acids and nonsynthetic citric acid are allowed for use as chelating
545 agents in organic agriculture (NOSB, 1995). Amino acids are considered nonsynthetic if they are produced
546 by plants, animals, and microorganisms that have not been genetically-modified or if they are extracted or
547 isolated by hydrolysis or by physical or other nonchemical means (NOSB, 1995).

548

549 **Evaluation Question #12: Describe any alternative practices that would make the use of the petitioned**
550 **substance unnecessary (7 U.S.C. § 6518 (m) (6)).**

551
552 **Pear Flotation:** Pear damage can occur throughout the harvest process, but one of the main sources of
553 damage is when the pears are dumped from bins during rapid unloading. Dry dumps from harvest bins to
554 packing bins can cause the most damage, whereas wet dumps (from a dry bin into a water-filled bin)
555 decrease the potential for fruit injury. Wet dumps also allow pears to more easily move onto conveyors
556 where they are inspected and packed. Due to the high density of pears, some are heavier than water.
557 Flotation salts, including lignin sulfonates, are sometimes added to increase dump water density and allow
558 the pears to float, thus reducing the chance for injury and increasing packing efficiency – a process called
559 an immersion dump. The fruit is then circulated in the dump water using a pump, which floats the fruit to
560 an elevator where it is rinsed and moved to a conveyor for packaging. The flotation salts could be left out
561 of the process and non-immersion water dumps could be used. To minimize damage in non-immersion
562 dumps from fruit-to-fruit injury, more time is required to allow fruit to move onto conveyors before
563 additional fruit is dumped. Additional steps to reduce fruit damage have also been proposed which
564 include using padded picking containers or plastic-lined wooden picking bins to reduce scuffing (Agar and
565 Mitcham, 2000).

566
567 **Dust Suppression:** Alternate methods of dust suppression from best management practices include:
568 vegetative cover (for non-traffic areas); mulch (including gravel mulch); sprinkling with water; spray-on
569 adhesives (including anionic asphalt emulsion, resin in water, and latex emulsion); applications of stone or
570 gravel to disturbed roads; barriers to control air currents; or surface roughening at angles perpendicular to
571 prevailing winds (U.S. EPA, 2006; Idaho DEQ, 2005). Most of these methods (with the exception of
572 adhesive applications and water sprays) do not involve applications similar to those used for lignin
573 sulfonate, but are physical manipulations of the landscape. Cost, available resources, level of control, and
574 the extent of the dust problem are factors that may affect the choice of dust control measures (U.S. EPA,
575 2006).

576
577 Researchers at Colorado State University evaluated three dust suppressants – calcium lignosulfonate,
578 magnesium chloride, and calcium chloride – for their effectiveness in reducing dust emissions from
579 unpaved roads (Sanders and Addo, 1993). Preliminary data analysis indicated that all suppressants
580 reduced the dust emitted compared to untreated roads (Sanders and Addo, 1993). Final data (Sanders and
581 Addo, 1993) showed that the aggregate loss of road height after one year was 5.18, 5.80, and 7.01 mm for
582 roads treated with magnesium chloride, calcium lignosulfonate, and calcium chloride, respectively
583 (Sanders and Addo, 2008). The untreated road showed an aggregate loss of 15.55 mm after one year.

584
585 **Micronutrient Fertilizer Chelates:** In addition to the use of allowed nonsynthetic chelates, soil fertility can
586 be managed in other ways. Naturally-occurring chelates in the soil include humates, fulvates, and organic
587 root exudates. Fulvates and humates are found naturally in most soils as the result of the decomposition of
588 organic matter. Management practices, including no-till farming or manure applications, can increase
589 organic matter in the soil and thereby increase the rate of naturally-occurring chelates (Jones and Jacobsen,
590 2009)

591
592 **References:**

593
594 Agar, I.T. and Mitcham E.J. 2000. Commercial handling influences quality and ripening of Bartlett pears.
595 California Agriculture. 54: 3, May-June, 2000.

596
597 Apel, G. 1993. Flotation Materials for Pears. Tree Fruit Postharvest Journal 4(1): 19-21.

598
599 Ash, M. and Ash, I. 2004. Handbook of Green Chemicals. Synapse Information Resources, Inc. Endicott,
600 NY. p. 308.

601

- 602 Baicor, L.C. 2011. Plant Stimulator™ “Buffer”. Baicor, L.C. Website. Retrieved January 12, 2011 from
603 <http://www.baicor.com/products/view/18>.
604
- 605 CAMEO Database of Hazardous Materials. Undated - a. Ammonium Ligninsulfonate. Office of Response
606 and Restoration, NOAA’s Ocean Service, National Oceanic and Atmospheric Administration. Retrieved
607 December 8, 2010 from <http://cameochemicals.noaa.gov/chemical/19812>.
608
- 609 CAMEO Database of Hazardous Materials. Undated - b. Lignosulfonic Acid – Sodium Salt. Office of
610 Response and Restoration, NOAA’s Ocean Service, National Oceanic and Atmospheric Administration.
611 Retrieved December 8, 2010 from <http://cameochemicals.noaa.gov/chemical/20567>.
612
- 613 Canadian General Standards Board. 2009. Can/Cgsb-32.311-2006: Organic Production Systems Permitted
614 Substances Lists. Retrieved December 9, 2010 from [http://www.tpsgc-](http://www.tpsgc-pwgsc.gc.ca/cgsb/on_the_net/organic/032_0311_2006-e.pdf)
615 [pwgsc.gc.ca/cgsb/on_the_net/organic/032_0311_2006-e.pdf](http://www.tpsgc-pwgsc.gc.ca/cgsb/on_the_net/organic/032_0311_2006-e.pdf).
616
- 617 CFR. 2003a. Title 7, Subtitle B, Subchapter M – Organic Foods Production Act Provisions, Part 205.105 –
618 Allowed and prohibited substances, methods, and ingredients in organic production and handling. (7 CFR
619 205.105). Retrieved December 9, 2010 from http://edocket.access.gpo.gov/cfr_2003/pdf/7CFR205.105.pdf.
620
- 621 CFR. 2003b. Title 7, Subtitle B, Subchapter M – Organic Foods Production Act Provisions, Part 205.601 -
622 Synthetic substances allowed for use in organic crop production. (7 CFR 205.601(j)(4)). 2003a. Retrieved
623 December 9, 2010 from http://edocket.access.gpo.gov/cfr_2005/janqtr/pdf/7cfr205.601.pdf
624
- 625 CFR. 2003c. Title 7, Subtitle B, Subchapter M – Organic Foods Production Act Provisions, Part 205.601 -
626 Synthetic substances allowed for use in organic crop production. (7 CFR 205.601(l)(1)). Retrieved December
627 9, 2010 from http://edocket.access.gpo.gov/cfr_2005/janqtr/pdf/7cfr205.601.pdf.
628
- 629 CFR. 2004a. Title 40, Chapter 1, Subchapter E – Pesticide Programs, Part 180 – Tolerances and Exemptions
630 from Tolerances for Pesticide Chemicals in Food, 180.910 – Inert ingredients used pre- and post-harvest;
631 exemptions from the requirement of a tolerance. (40 CFR 180.910). Retrieved December 9, 2010 from
632 http://edocket.access.gpo.gov/cfr_2004/julqtr/pdf/40cfr180.910.pdf.
633
- 634 CFR. 2004b. Title 40, Chapter 1, Subchapter E – Pesticide Programs, Part 180 – Tolerances and Exemptions
635 from Tolerances for Pesticide Chemicals in Food, 180.930 – Inert ingredients applied to animals;
636 exemptions from the requirement of a tolerance. (40 CFR 180.930). Retrieved December 9, 2010 from
637 http://edocket.access.gpo.gov/cfr_2004/julqtr/pdf/40cfr180.930.pdf.
638
- 639
- 640 Cho, N.-M., Shin, W., Jeong, S.-W., and Leonowicz, A. 2004. Degradation of Lignosulfonate by Fungal
641 Laccase with Low Molecular Mediators. Bull. Korean Chem. Soc. 25 (10): 1551-1554.
642
- 643 Codex Alimentarius Commission. 2010. Codex Class Names and the International Numbering System for
644 Food Additives. (CAC-MISC 6-2010). Joint FAO/WHO Expert Committee on Food Additives (JECFA).
645 Retrieved December 9, 2010 from <http://www.fao.org/ag/agn/jecfa-additives/search.html?lang=en>.
646
- 647 CPWA. 2005. Dust Control for Unpaved Roads, A Best Practice by the National Guide to Sustainable
648 Municipal Infrastructure. Canadian Public Works Association. Retrieved on December 14, 2010 from
649 http://gmf.fcm.ca/files/Infraguide/Roads_and_Sidewalks/dust_control_unpaved_rd.pdf.
650
- 651 FAO. 2008. Calcium Lignosulfonate JECFA Monograph 40-65. Published in FAO JECFA Monographs 5.
652 United Nations Food and Agriculture Organization Joint Expert Committee for Food Additives (JECFA).
653

- 654 Federal Register. 2005. Lignosulfonates; Exemptions from the Requirement of a Tolerance. Federal Register
655 70 (31): 7912-7921.
656
- 657 Garcia-Valls, R., Angles, N., and Barba, C. 2001. Lignin compounds for the complexation of metal ions with
658 environmental impact. 1st World Conference on Biomass for Energy and Industry, Sevilla, Spain, 5-9 June
659 2000. 1090-1092.
660
- 661 Georgia-Pacific West, Inc. 2000. Material Safety Data Sheet, LIGNOSITE® 458 Sodium Lignosulfonate
662 Powder. Retrieved December 13, 2010 from [http://www.hillbrothers.com/msds/pdf/n/lignosite-458-](http://www.hillbrothers.com/msds/pdf/n/lignosite-458-dry.pdf)
663 [dry.pdf](http://www.hillbrothers.com/msds/pdf/n/lignosite-458-dry.pdf).
664
- 665 Gundersen, S.A. and Sjoblom, J. 1999. High- and low-molecular-weight lignosulfonates and Kraft lignins as
666 oil/water-emulsion stabilizers studied by means of electrical conductivity. *Colloid Polym Sci* 277:462-468.
667
- 668 Hawley, G.G. 1981. *The Condensed Chemical Dictionary*. 10th ed. New York: Van Nostrand Reinhold Co.,
669 p. 944.
670
- 671 IFOAM. 2008. IFOAM Indicative List of Substances for Organic Production and Processing. Retrieved
672 December 8, 2010 from
673 http://www.ifoam.org/about_ifoam/standards/pdfs/20080423_IFOAM_Indicative_List.pdf.
674
- 675 Idaho DEQ. 2005. IDEQ Storm Water Best Management Practices Catalog. Idaho Department of
676 Environmental Quality. Retrieved January 12, 2011 from
677 http://www.deq.idaho.gov/water/data_reports/storm_water/catalog/sec_2/bmps/7.pdf.
678
- 679 Jones, C. and Jacobsen, J. 2009. Micronutrients: Cycling, Testing and Fertilizer Recommendations. Nutrient
680 Management Module No. 7. From Nutrient Management: a self-study course from MSU Extension
681 Continuing Education Series. Montana State University Cooperative Extension. Publication 4449-7. May
682 2009. Retrieved on January 12, 2011 from <http://landresources.montana.edu/nm/Modules/Module7.pdf>.
683
- 684 Jones, D. and Mitchley, M. 2001. A reassessment of the use of ligno sulphonate as an additive for unsealed
685 roads. Proceedings of the 20th ARRB Conference. Melbourne, Victoria, Australia. Retrieved February 4,
686 2011 from <http://www.auststap.com.au/20arrb/ARRBpaperF.pdf>.
687
- 688 Lauten, R.A., Myrvold, B.O., and Gundersen S.A. 2010. *New Developments in the Commercial Utilization of*
689 *Lignosulfonates*. Surfactants from Renewable Resources. Kjellin, M. and Johansson I, eds. John Wiley and
690 Sons Ltd. West Sussex, UK. p. 272-274.
691
- 692 LignoTech. 2009. Product Information including: Binding Agent, Dispersing Agent, Dust Suppressant, and
693 Emulsion Stabilisers. LignoTech USA, Inc. Retrieved on December 6, 2010 from
694 <http://www.lignotech.com/>.
695
- 696 Luscombe, D.K. and Nicholls, P.J. 1973. Acute and subacute oral toxicity of AHR-2438B, a purified sodium
697 lignosulphonate, in rats. *Food and Cosmetics Toxicology*. 11(2):229-237.
698
- 699 Marcus, R. and Watts, J. 1974. Ulcerative disease of the colon in laboratory animals induced by pepsin
700 inhibitors. *Gastroenterology*. 67(3):473-483.
701
- 702 McLellan, M.R. and Padilla-Zakour, O.I. 2005. Chapter 4: Juice Processing. In *Processing Fruits: Science and*
703 *Technology*, Second Edition. Eds. Diane M. Barrett, Laszlo Somogyi, Hosahalli Ramaswamy. CRC Press,
704 Boca Raton, FL. p. 90-91.
705

- 706 Munro, I.C. and Baines, J. 2009. Calcium lignosulfonate (40-65). In Safety evaluation of certain food
707 additives. Prepared by the Sixty-ninth meeting of the Joint FAO/WHO Expert Committee on Food
708 Additives (JECFA). International Program on Chemical Safety, Food and Agriculture Organization of the
709 United Nations/World Health Organization. Geneva, Switzerland. Retrieved January 14, 2011 from
710 http://whqlibdoc.who.int/publications/2009/9789241660600_eng.pdf.
711
- 712 NOSB. 1995. National Organic Standards Board Materials Database: Lignin Sulfonates. Retrieved
713 December 6, 2010 from <http://www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELPRDC5057314>.
714
- 715 NOSB. 2009. Guidance Discussion Document on Inerts in Pesticides Allowed for use in Organic
716 Agriculture. Crops Committee, National Organic Standards Board. Retrieved January 12, 2011 from
717 <http://www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELPRDC5079596>.
718
- 719 NLM. 2011a. ChemIDplus Lite – Lignosulfuric acid. TOXNET, Toxicology and Environmental Health
720 Information Program, U.S. National Library of Medicine, Bethesda, MD. Retrieved February 3, 2011 from
721 <http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jspv>.
722
- 723 NLM. 2011b. PubChem Chemical Structure Search – Lignin sulfonate. National Center for Biotechnology
724 Information, U.S. National Library of Medicine, Bethesda, MD. Retrieved January 11, 2011 from
725 http://pubchem.ncbi.nlm.nih.gov/summary/summary.cgi?cid=24712&loc=ec_rcs.
726
- 727 OMRI. 2010. OMRI Brand Name Products List and Generic Materials List, Organic Materials Review
728 Institute. Eugene, Oregon. Retrieved on December 6, 2010 from [http://www.omri.org/simple-gml-
729 search/results/lignin](http://www.omri.org/simple-gml-search/results/lignin).
730
- 731 Ouyang, X., Qiu, X., Lou, H., and Yang, D. 2006. Corrosion and Scale Inhibition Properties of Sodium
732 Lignosulfonate and Its Potential Application in Recirculating Cooling Water System. *Ind. Eng. Chem. Res.*
733 45 (16): 5716–5721.
734
- 735 Pure Lignin. 2010. Lignin. Pure Lignin Environmental Technology. Retrieved December 8, 2010 from
736 <http://purelignin.com/lignin>.
737
- 738 Roald, S.O. 1977. Acute toxicity of lignosulfonates on rainbow trout, *Salmo gairdneri*. *Bulletin of*
739 *Environmental Contamination and Toxicology*. 17 (6): 702-706.
740
- 741 Sanders, T.G. and Addo, J.Q. 1993. Effectiveness and environmental impact of road dust suppressants.
742 Department of Civil Engineering, Colorado State University. Retrieved on December 16, 2010 from
743 <http://www.mountain-plains.org/pubs/pdf/MPC94-28.pdf>.
744
- 745 Sanders, T.G. and Addo, J.Q. 2008. Road dust suppressants research results. 2008 Road Dust Management
746 Practices and Future Needs Conference, San Antonio, Texas. Retrieved on December 16, 2010 from
747 <http://www.westerntransportationinstitute.org/professionaldevelopment/dust/2008/default.aspx>
748
- 749 Selin, J.F., Sundman, V., Raiha, M. 1975. Utilization and Polymerization of Lignosulfonates by Wood-
750 Rotting Fungi. *Arch. Microbiol.* 103:63-70.
751
- 752 Sugar, D. 2002. Pear Flotation Studies, 2001-2002. 2002 Proceedings of the Washington Tree Fruit
753 Postharvest Conference, March 12th & 13th, Yakima, WA. WSU-TFREC Postharvest Information Network.
754 Washington State University, Pullman, WA. Retrieved on December 16, 2010 from
755 <http://postharvest.tfrec.wsu.edu/PC2002K.pdf>.
756
- 757 Sugar, D. and Spotts, R.A. 1986. Effects of flotation salt solutions on spore germination of four decay fungi
758 and on side rot of pear. *Plant Disease* 70: 1110-1112.

- 759
760 Sugar, D. and Spotts, R.A. 1989. Flotation materials for pear. Post Harvest Pomology Newsletter.
761 Washington State University – Tree Fruit Research and Extension Center. 7(2): 5-7.
762
- 763 Sullivan, J.B. Jr. and Krieger G.R. (eds.). 1992. Hazardous Materials Toxicology–Clinical Principles of
764 Environmental Health. Baltimore, MD: Williams and Wilkins, p. 969.
765
- 766 Toledo, M.C.F. and Kuznesof, P.M. 2008. Calcium Lignosulfonate (40-65) Chemical and Technical
767 Assessment. Joint FAO/WHO Expert Committee on Food Additives. World Health Organization, Geneva,
768 Switzerland. Retrieved on January 13, 2011 from
769 http://www.fao.org/ag/agn/agns/jecfa/cta/69/Calcium_Lignosulfonate%20_40_65_CTA_69.pdf.
770
- 771 USDA. 1969. Lignin and its uses. Research Note FPL -0206. Forest Products Laboratory, Forest Service, US
772 Department of Agriculture. Madison, WI. Retrieved on December 14, 2010 from
773 <http://www.fpl.fs.fed.us/documnts/fplrn/fplrn0206.pdf>.
774
- 775 USDA. 2009. Global Agriculture Information Network (GAIN) Report. Japan Lifts Two Banned Substances
776 for the U.S. Organic Trade. GAIN Report JA9005, January 16, 2009. Foreign Agricultural Service, US
777 Department of Agriculture. Retrieved from <http://www.fas.usda.gov/gainfiles/200901/146327052.pdf>.
778
- 779 U.S. EPA. 1990. Chemical Wood Pulping. In AP-42, Compilation of Air Pollutant Emission Factors, Chapter
780 10: Wood Products Industry. Technology Transfer Network, Clearinghouse for Inventories & Emissions
781 Factors. Retrieved on December 9, 2010 from
782 <http://www.epa.gov/ttn/chief/ap42/ch10/final/c10s02.pdf>.
783
- 784 U.S. EPA. 2006. Dust Control Fact Sheet. National Pollutant Discharge Elimination System, US
785 Environmental Protection Agency. Retrieved on January 14, 2011 from
786 <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=52>.
787
788
- 789 U.S. EPA. 2007. Label Review Manual. Office of Pesticide Programs, Office of Prevention, Pesticides, and
790 Toxic Substances, US Environmental Protection Agency. Retrieved on December 13, 2010 from
791 <http://www.epa.gov/oppfead1/labeling/lrm/chap-07.pdf>.
792
- 793 U.S. EPA. 2010a. Inert Ingredients Permitted for Use in Nonfood Use Pesticide Products. Office of
794 Prevention, Pesticides and Toxic Substances, U.S. Environmental Protection Agency, Washington, DC.
795 Updated March 28, 2010.
796
- 797 U.S. EPA. 2010b. Index of chemical names and pesticide chemical codes report; updated 9/30/10.
798 Retrieved on January 25, 2011, from <http://www.epa.gov/pesticides/DataSubmittersList/>.
799
- 800 U.S. EPA. 2010c. Dioxin. National Center for Environmental Assessment, US Environmental Protection
801 Agency. Retrieved on December 13, 2010 from <http://www.epa.gov/dioxin>.
802
- 803 U.S. EPA. 2011a. Regulating Pesticides: Laws and Regulations. Office of Pesticide Programs, US
804 Environmental Protection Agency. Retrieved on January 14, 2011 from
805 <http://www.epa.gov/pesticides/index.htm>.
806
- 807 U.S. EPA. 2011b. Sulfur Dioxide. Office of Air and Radiation, U.S. Environmental Protection Agency.
808 Retrieved February 4, 2011 from <http://www.epa.gov/oaqps001/sulfurdioxide/>
809
- 810 Westvaco Corp. 1987. Ammonium Lignosulfonates. US Patent Number 4636224. Retrieved on December 7,
811 2010 from <http://www.wikipatents.com/US-Patent-4636224/ammonium-lignosulfonates>.

- 812
813 Zhor, J. and Bremner, T.W. 1999. *Role of Lignosulfonates in High Performance Concrete*. The Role of
814 Admixtures in High Performance Concrete. Proceedings of the International RILEM Conference. Edited by
815 JG Cabrera and R. Rivera-Villareal. p. 143-146.

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:

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 Vraboschik

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 flotation available.

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

Signature

Philip Vraboschik

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: Lignosulfonates

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. ~~See attached.~~

Calcium & Magnesium lignosulfonates only. Sodium possibly as an inert, but not as an active.

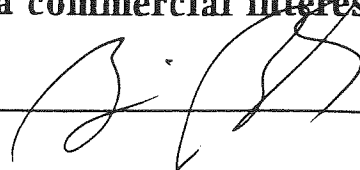
Please comment on the accuracy of the information in the file:

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

Any additional comments? (attachments welcomed)

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

Signature



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:

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 WSCU 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; No

Signature Diana 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 + NH₄ 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 IMPACT)

- (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 suppressant when used on roads and parking lots (ammonium lignosulfonate preferred). Flotation material for pears. Stabilizes emulsions and increases wettability 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 suppressant it binds the soil particles together by generating a large cohesive force.

Combinations

OFPA 2118(c)1(B) sulfur compound

N. L. Restriction Allowed for use with micronutrients and macronutrients and as a chelating agent. Allowed for use as a dust suppressant.

EPA, FDA, etc

Safety Guidelines

Directions

Registration

State Differences

Historical status usually included with the restrictions for micronutrients.

International status

NOSB Materials Database

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 suppressant), 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 disinfectant-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 SO₂, 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
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 LC₅₀ Static Bioassay of LIGNOSITE Calcium Lignosulfonate liquid at 50% solids gave a lethal concentration (LC₅₀) of 4250 mg/l 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.



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

<u>COMPONENT</u>	<u>% (WT OR VOL)</u>	<u>ACGIH TWA UNITS</u>	<u>ACGIH STEL UNITS</u>	<u>OSHA PEL UNITS</u>
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 CO₂.

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

Conditions to Avoid: None known.

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

Hazardous Decomposition Products: Sulfur dioxide (SO₂) possible.

Hazardous Polymerization: WILL OCCUR WILL NOT OCCUR

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.

GEORGIA-PACIFIC CORPORATION - MSDS**LIGNOSITE 458 Sodium Lignosulfonate liquid**

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 (FHA) criteria.

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

**Formal Recommendation by the
National Organic Standards Board (NOSB)
to the National Organic Program (NOP)**

Date: April 29, 2011

Subject: Lignin Sulfonate § 205.601(I) relisting for Sunset 2012

Chair: Tracy Miedema

The NOSB hereby recommends to the NOP the following:

Rulemaking Action X
Guidance Statement
Other

Statement of the Recommendation (Including Recount of Vote):

The Board recommends the continued listing of Lignin Sulfonate on 205.601 (I) As floating agents in post harvest handling.

Rationale Supporting Recommendation (including consistency with OFPA and NOP):

There were concerns during the last round of sunset for this material about its fate in waste water when it is used as a flotation agent. On February 15, 2011 the Crops Committee addressed this concern with an annotation to relist lignin sulfonate on 205.601 (I) with the amended annotation: As floating agents in postharvest handling, subject to wastewater disposal documentation in the Organic Systems Plan to prevent adverse impact to aquatic life. It was also noted that there is a duplicate listing as a flotation agent in (j) As plant or soil amendments, so the Crops Committee is recommending relisting lignin sulfonate as plant or soil amendments with the annotation change: chelating agent, dust suppressant (see separate recommendation). The Crops Committee considered new public comment in reviewing this material, finding that existing regulatory oversight is adequate to the task of monitoring wastewater disposal concerns and recommended relisting this material as is.

Committee Vote:

Moved: John Foster		Second: Steve Demuri		
Yes: 14	No: 0	Abstain: 0	Absent: 0	Recusal: 0

**National Organic Standards Board
Crops Committee
2012 Sunset Proposed Recommendation
Lignin sulfonate**

April 29, 2011

List: §205.601 Synthetic substances allowed for use in organic crop production.

- (l) As floating agents in postharvest handling.
 - (1) Lignin sulfonate.

Committee Summary

There were concerns during the last round of sunset for this material about its fate in waste water when it is used as a flotation agent. On February 15, 2011 the Crops Committee addressed this concern with an annotation to relist lignin sulfonate on 205.601 (l) with the amended annotation: As floating agents in postharvest handling, subject to wastewater disposal documentation in the Organic Systems Plan to prevent adverse impact to aquatic life. It was also noted that there is a duplicate listing as a flotation agent in (j) As plant or soil amendments, so the Crops Committee is recommending relisting lignin sulfonate as plant or soil amendments with the annotation change: chelating agent, dust suppressant.

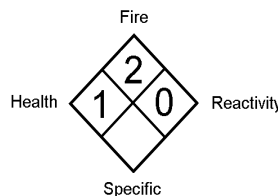
The Crops Committee considered new public comment in reviewing this material, finding that existing regulatory oversight is adequate to the task of monitoring wastewater disposal concerns and did not reconsider the motion for the listing of this material as a crop or soil input.

Committee Recommendation

Relist lignin sulfonate on § 205.601(l): As floating agents in postharvest handling (1) Lignin sulfonate

Committee Vote

Motion: Tina Ellor Second: Steve Demuri
Yes: 7 No: 0 Absent: 0 Abstain: 0 Recuse: 0



MATERIAL SAFETY DATA SHEET

LIGNOSITE[®] 458 SODIUM LIGNOSULFONATE POWDER

SECTION 1 - PRODUCT IDENTIFICATION

Product Name and Synonyms:

LIGNOSITE[®] 458; Sodium Lignosulfonate.

CAS Name and Number:

Lignosulfonic Acid, Sodium Salt; CAS# 8061-51-6.

Chemical Family: Lignin.

Chemical Formula: Unknown.

Manufacturer's Name and Address

GEORGIA-PACIFIC WEST, INC.
300 W. Laurel Street (98225)
P.O. Box 1236
Bellingham, WA 98227
Telephone: 360-733-4410

Emergency Telephone Number

1-800-424-9300 CHEMTREC

SECTION 2 - HAZARDOUS INGREDIENTS

<u>COMPONENT</u>	<u>% WEIGHT OR VOL</u>	<u>ACGIH TWA UNITS</u>	<u>ACGIH STEL UNITS</u>	<u>OSHA PEL UNITS</u>
None	---	---	---	---

SECTION 3 - PHYSICAL PROPERTIES

Appearance and Odor: Brown powder with no appreciable odor.

Molecular Weight: Unknown.

Boiling Point (Degrees Fahrenheit): Solid.

Melting Point (Degrees Fahrenheit): Decomposes.

Vapor Pressure (MM of Mercury): Nil.

Specific Gravity (Water = 1): Approx. 0.5.

Vapor Density (Air = 1): Not applicable.

Percent Volatile (By Weight): 2-10% moisture.

pH: Approx. 6 - 8.

Solubility in Water: Soluble.

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

SECTION 4 - FIRE AND EXPLOSION DATA

Flash Point: Not applicable.

Fire Extinguishing Media: Water or CO₂.

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

Special Firefighting Procedures & Equipment: Normal.

Unusual Fire and Explosion Hazards: Dust explosions may occur when finely divided particles are mixed with air in the presence of an ignition source. Avoid excessive accumulation of dust on floors, beams, or machinery. Ignition temperature is approximately 250-300°C.

SECTION 5 - 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 (SO₂) possible.

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: Prolonged exposure to high levels of dust in air may cause sneezing, coughing, or other nuisance symptoms.

Probable Routes of Exposure: Skin, inhalation, 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 to relieve nuisance symptoms.

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

Inhalation: Four-hour exposure of rats to 198 mg/m³ 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): Air purifying respirator recommended for prolonged exposure to high concentrations.

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

Ventilation

Local Exhaust: Recommended. Because of the explosive potential of organic dust when suspended in air, precautions should be taken to prevent sparks or other ignition sources in ventilation equipment. Use of totally enclosed motors is recommended.

Mechanical (General): Recommended.

Special: Use explosion-proof equipment for dusty conditions.

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: Sodium lignin sulfonate is regulated under 21 CFR 175.105 as a substance for use as a 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. Unty 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. Uning food. 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: USDA self-certified (9 CFR 317.20); is FDA approved.

CPSC: Not applicable.

TSCA: CAS# 8061-51-6, Lignosulfonic Acid, Sodium Salt.

DOT: Non-regulated.

Proper Shipping Name: None.

Hazard Class: None.

Label Required: None.

Identification No.: None.

Other Pertinent Information: None.

SECTION 11 - SPECIAL PRECAUTIONS AND COMMENTS

Precautions to be Taken in Handling and Storing

Store in a dry place and keep sealed until ready to use to prevent caking from moisture pickup. 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: 1/01/00

Supersedes: 5/27/98

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.

The symbol "●" indicates revision from previous issue.

MATERIAL SAFETY DATA SHEET

BorrePlex OA LIQUID
Internal No.: 203292

Date Prepared: 03/15/2011

Replaces: All Previous

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION
--

Trade Name : Calcium Lignosulfonate, Lignosulfonic Acid Mixture
Synonyms : See Above

CAS Numbers : 8061-52-7 + 8062-15-5

Manufacturer: LignoTech USA, Inc.
100 Grand Avenue
Rothschild, WI 54474-1198
Telephone: +1(715)359-6544
Fax: +1(715)355-3648

EMERGENCY PHONE +1(715)359-6544
***CHEMTREC PHONE** +1(800)424-9300

***Use only in the event of chemical emergencies involving a spill, leak, fire, exposure, or accident involving chemicals .**

SECTION 2. HAZARDOUS IDENTIFICATION
--

Emergency Overview: Considered an irritant to mucous membranes, skin and eyes. Characteristic of mild organic acids due to low pH.

SECTION 3. COMPOSITION / INFORMATION ON INGREDIENTS
--

<u>Ingredient Name</u>	<u>EINECS No.</u>	<u>CAS No.</u>	<u>Percent</u>
Calcium Lignosulfonate	Exempt Polymer	8061-52-7	Proprietary
Lignosulfonic Acid	Exempt Polymer	8062-15-5	Proprietary
Water		7732-18-5	45%
Component A		Proprietary	Proprietary

SECTION 4. FIRST AID MEASURES

Eyes: Flush eyes with water for at least 15 min. and consult with physician.
Skin: Wash skin with soap and water and consult with physician if problem occurs. Remove contaminated clothing.
Inhalation: Move to fresh air.
Ingestion: Give water to dilute and get medical attention.

SECTION 5. FIRE FIGHTING MEASURES
--

Extinguishing Media: Not Applicable
foam.
Improper Extinguishing Media: Not Applicable
Special Fire Fighting Procedures: None.
Fire and Explosion Hazards: May react with metals (iron, zinc or aluminum) to form highly flammable hydrogen

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal Precautions: Use personal protection recommended in Section 8.
Environmental Precautions: Avoid infiltration of large quantities into drains, surface water, groundwater and soil
Methods for Containment: Stop leak, use berms, dikes, absorbent material and drain covers.
Methods for Clean-up: Mechanically collect and remove spilled material. Area may be washed with water. Can be neutralized with sodium carbonate or bicarbonate.

SECTION 7. HANDLING AND STORAGE

Handling Precautions: Wash thoroughly after handling. Remove all contaminated clothing and wash before re-use. Use with adequate ventilation. Do not get on skin or in eyes. Avoid inhalation or ingestion.

Storage: Store in an area with secondary containment, cool, dry, well ventilated, away from incompatible substances.

SECTION 8. EXPOSURE CONTROLS /PERSONAL PROTECTION

OSHA PELV: None established. Minimize contact with eyes, skin, clothing.

Exposure Control: Use adequate general or local exhaust ventilation.

Respiratory Protection: Use NIOSH approved respirator when dusts, mists, or vapors are present.

Hand Protection: Wear appropriate gloves to prevent skin exposure.

Eye Protection: Wear appropriate eye glasses or chemical safety goggles.

Personal Protection: Wear appropriate protective clothing to prevent skin exposure.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid	Specific Gravity (25 C):	1.280
Melting Point :	Not Applicable	pH (3% Soln.):	2 - 3
Boiling Point (C):	104 C	Bulk Density (g/ml):	Not Applicable
Freezing Point (C):	-2 C	Dry Matter, %:	53 - 57%
Vapor Pressure (mm Hg):	14.2 @ 20 C	Solubility in Water:	100% Soluble
Vapor Density (Air = 1):	1.21 @ 20 C	Evaporation Rate:	Normal 0.4 (water)
% Volatiles By Weight:	43 - 47 (water)	Water/Oil Dist. Coeff.:	100% in water
Appearance & Odor:	Brown liquid with slight odor		

SECTION 10. STABILITY AND REACTIVITY

Stability: Stable.

Incompatibe Materials: Contact with strong oxidizing agents, iron, zinc, aluminum.

Hazardous Decomposition Products: Typical combustion products. May react with metals (iron, zinc, aluminum) to form highly flammable hydrogen gas which can form explosive mixtures with air.

Hazardous Polymerization: Will not occur.

Conditions to Avoid: None known.

SECTION 11. TOXICOLOGICAL INFORMATION

ACUTE (SINGLE EXPOSURE) TOXIC TESTS. PRODUCT/SIMILAR PRODUCT

<u>Route of exposure</u>	<u>Value/unit</u>	<u>Species</u>
Oral LD50	No Data	Rat

Skin Contact: Considered mild irritant due to pH.

Eye Contact: Considered an irritant characteristic of mild organic acid due to pH

Sensitization to Material:

CHRONIC TOXICITY: Product/Similar Product

Carcinogen Listings: Not a carcinogen.

Mutagenicity: None Known.

SECTION 12. ECOLOGICAL INFORMATION

PRODUCT/SIMILAR PRODUCT

Biological oxygen demand(BOD): Partially biodegradable.

Chemical oxygen demand(COD):

SECTION 13. DISPOSAL INFORMATION

General Regulations: Dispose or destroy in accordance with official recommendations and applicable legislation

SECTION 14. TRANSPORTATION INFORMATION

Shipping Name - DOT:	Lignin Liquor - Class 55	Harmonized Tariff Code for US:	3804.00.1000-0
Hazard Class - DOT:	Not Restricted	Hazard Class - IATA:	Not Restricted
UN Number:	Excluded	EU Classified as Dangerous Goods:	No

SECTION 15. REGULATORY INFORMATION

GLOBAL CHEMICAL INVENTORY STATUS

SECTION 16. OTHER INFORMATION

HMIS Rating(0-4) HEALTH = 1 FIRE = 0 REACTIVITY = 0 SPECIAL = 0

Prepared by: LignoTech USA, Inc.

Tim McNally

The information and recommendations contained herein are offered as a service to our customers but are not intended to relieve the user from its responsibility to investigate and understand pertinent sources of information and to comply with all laws and procedures applicable to the safe handling and use of these materials. The information and recommendations provided herein were believed by LignoTech USA, Inc. to be accurate at the time of preparation or obtained from sources believed to be generally reliable. However, LignoTech USA, Inc. makes no warranty concerning their accuracy and LignoTech USA, Inc. will not be liable for claims relating to any party's use of or reliance on information or recommendations contained herein, regardless of whether it is claimed that the information or recommendations are inaccurate, incomplete or otherwise misleading.

MATERIAL SAFETY DATA SHEET

SECTION 1

CHEMICAL NAME: Sodium Ligno-Sulfonate
PRODUCT NAME: (OMRI) Plant Stimulator (Buffer)
MANUFACTURERS NAME: BAICOR L.C.
% ACTIVITY: 3.0% lingo-sulfonate
ADDRESS: 1895 North 600 West, Logan Utah 84321
EMERGENCY TELEPHONE NO.: (435) 752-2475

SECTION 2 HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

HAZARDOUS COMPONENTS

(SPECIFIC CHEMICAL IDENTITY; OSHA PEL	ACGIH TLV	C.A.S. NO.	SARA
Mixture			
COMMON NAME)	(Mg/M ³)	(Mg/M ³)	%

None

SECTION 3 - PHYSICAL/CHEMICAL CHARACTERISTICS

BOILING POINT: > H ₂ O	SPECIFIC GRAVITY: (H ₂ O=1) 1.15	VAPOR PRESSURE: (MM HG):N/A
MELTING POINT: N/A	VAPOR DENSITY (AIR=1): N/A	EVAPORATION RATE: < H ₂ O
pH: 1.5		(BUTYL ACETATE=1): N/A
APPEARANCE AND ODOR: Dark Brown, slight odor.		

SECTION 4 FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD):	FLAMMABLE LIMITS: LEL N/A UEL N/A
EXTINGUISHING MEDIA: Water	
SPECIAL FIREFIGHTING PROCEDURES: N/A	
UNUSUAL FIRE & EXPLOSION HAZARDS: N/A	

SECTION 5 - REACTIVITY DATA

STABILITY: STABLE: X	UNSTABLE:	CONDITIONS TO AVOID: N/A
INCOMPATIBILITY (MATERIALS TO AVOID): N/A		
HAZARD DECOMPOSITION OR BY-PRODUCTS: N/A		
HAZARD POLYMERIZATION: MAY OCCUR:	MAY NOT OCCUR: X	
CONDITIONS TO AVOID: N/A		

SECTION 6 - HEALTH HAZARD DATA

PRODUCT: (OMRI) Plant stimulator (Buffer)
TOXICITY: None found
ROUTES (S) OF ENTRY: INHALATION SKIN: X INGESTION: X
CARCINOGENICITY: NTP: NO IARC MONOGRAPHS: NO OSHA REGULATED: NO
HEALTH HAZARDS (ACUTE & CHRONIC)/SIGNS AND SYMPTOMS OF EXPOSURE:

This product may cause eye and skin irritation (See emergency and first aid procedures).

EMERGENCY AND FIRST AID PROCEDURES:

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

Skin: Wash contaminated areas with plenty of water for 15 minutes. Remove contaminated clothing and footwear and wash clothing before reuse. If skin irritation continues consult an physician.

Ingestion: Do not give anything by mouth to an unconscious person. If swallowed do not induce vomiting, give one or two glasses of milk or water. Contact a physician immediately.

SECTION 7 - PRECAUTION FOR SAFE HANDLING AND USE

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Absorb liquid spills with a dry absorbent, containerize unusable material for disposal in an approved waste facility.

WASTE DISPOSAL METHOD: Dispose in closed containers, at an approved landfill, in accordance with local, state and federal regulations. Material may also be flushed with water to a wastewater treatment system.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Store in original plastic containers in a cool, well-ventilated, dry place at temperatures above 50 degrees C. Do not store in contact with strong alkalis, acids, oxidizing agents. Do not stack pallets more than two high.

OTHER PRECAUTIONS: Avoid Ingestion, contact with eyes, skin and clothing.

SECTION 8 - CONTROL MEASURES

RESPIRATORY PROTECTION: NIOSH/MSHA approved for mists. Use with adequate ventilation and employ respiratory protection when exposure to mist and spray is possible.

VENTILATION:N/A (have adequate ventilation).

PROTECTIVE GLOVES: Impervious gloves.

EYE PROTECTION: Side shield safety glasses or goggles.

OTHER PROTECTIVE CLOTHING AND EQUIPMENT: Protective clothing to minimize skin contact should be worn. Chemically-resistant safety shoes. Wash contaminated clothing with soap and water and dry before reuse. Safety showers and eye wash facilities should be provided in all areas in which this product is handled.

WORK/HYGIENIC PRACTICES: Good housekeeping procedures should be followed to minimize exposure.

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