

**National Organic Standards Board
Crops Subcommittee
Petitioned Material Proposal
Sodium Carbonate Lignin
August 4, 2020**

Summary of Petition:

Sodium carbonate lignin has been petitioned for use in organic crop production through addition to the National List at 205.601(j)(4) of "lignins" as a dust suppressant. Lignin sulfonate, another type of lignin, is currently listed at 205.601(j)(4) for use as a chelating agent and dust suppressant. The petitioned material results from a paper pulping process that uses sodium carbonate and sodium hydroxide to extract lignin. Lignins found in plant cell walls are amorphous, complex biopolymers. Lignins make up 20-30 percent of plant cell walls, 30 percent of the total mass in softwood, 20-25 percent of the total mass in hardwoods and a smaller percentage of the total mass of herbaceous species. Commercial lignins are obtained as byproducts of the bioethanol and paper pulping industries.

Sodium carbonate lignin has a variety of potential uses. Lignins are used for binding and are added in fertilizer formulations to improve granule formation by binding extrusion granules. They also prevent fertilizer caking during storage. Lignins are also used for dust suppression. They are useful as binders in fertilizer and feed formulation because improving the quality of the pelletizing or granulation of these materials is a well-known measure for dust suppression. Adding binders such as lignin increases fertilizer granule strength, thereby reducing the formation of dust. Lignins have also been sprayed on roads for dust control.

Lignins are used to chelate micronutrients in fertilizer formulations to form more stable, yet still soluble, complexes that improve plant micronutrient availability.

Summary of Review:

At this time there has not been any public comments on sodium carbonate lignin, but lignin sulfonate has been reviewed and public comments on this product have been positive for relisting during sunset review. A survey of regulations for organic production from a number of countries and international organizations indicates that the use of sodium carbonate lignin is not generally permitted while lignin sulfonate is approved by many of the international organizations.

Category 1: Classification

1. For CROP use: Is the substance **Non-synthetic** or **X Synthetic**?
Is the substance formulated or manufactured by a process that chemically changes a substance extracted from naturally occurring plant, animal, or mineral sources? [OFPA §6502(21)] If so, describe, using [NOP 5033-1](#) as a guide.

The petition describes the process used to manufacture sodium carbonate lignin both as soda ash pulping and soda pulping. Wood chips are subjected to a solution of either sodium carbonate or a combination of sodium carbonate and sodium hydroxide and coked in steam under pressure for 15 minutes. The cooked wood chips are then mechanically pressed to separate the spent cooking liquor which is then evaporated to a dry powder. Lignin is a natural product that is chemically altered to become synthetic.

2. Reference to appropriate [OFPA](#) category:
Is the substance used in production, and does it contain an active synthetic ingredient in the following categories: [§6517(c)(1)(B)(i)]; copper and sulfur compounds; toxins derived from bacteria; pheromones, soaps, horticultural oils, fish emulsions, treated seed, vitamins and minerals; livestock parasiticides and medicines and production aids including netting, tree wraps and seals, insect traps, sticky barriers, row covers, and equipment cleansers; or (ii) is used in production and contains synthetic inert ingredients that are not classified by the Administrator of the Environmental Protection Agency as inerts of toxicological concern?

The petitioner is requesting that sodium carbonated lignin to 7 CFR 205.601(j)(4) as a synthetic substance allowed for use in organic crop production as a plant and soil amendment for dust suppression in addition to lignin sulfonate.

Category 2: Adverse Impacts

1. What is the potential for the substance to have detrimental chemical interactions with other materials used in organic farming systems? [§6518(m)(1)]

Soil stabilization with sulfur-free lignin has been studied and application of the lignin was found to slightly decrease soil pH, but was still comparable to the pH of natural soil. Different types of lignin phenols can be inhibitory to some fungal species, but they may also stimulate microbial activity depending on the amount of lignin applied. The use of the petitioned substance for dust control has the potential to increase soil aggregate size and water retention, which some researchers suggest may be ecologically beneficial.

2. What is 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? [§6518(m)(2)]

Environmental studies over the last 30 years have shown lignin sulfonates to be nontoxic at concentrations above those used (TR 621). Lignins have been shown to be an important precursor in the formation of humic substances (TR 601) and they can increase soil organic carbon and total nitrogen. Lignins are toxic in wastewater streams from the paper pulping process and can be toxic to aquatic organisms. Using lignin sulfonates in organic farming could benefit the environment by removing them from the paper manufacturing process waste stream.

3. Describe the probability of environmental contamination during manufacture, use, misuse or disposal of such substance? [§6518(m)(3)]

There are four pulping processes that make up the majority of production methods. As one study reported, the soda process has the lowest potential environmental impact as measured by a waste reduction algorithm developed by the EPA's National Risk Management Research Laboratory. None of the literature reviewed by the 2020 Technical Review suggested that the use of lignins as petitioned would result in environmental contamination of organic systems.

4. Discuss the effect of the substance on human health. [§6517(c)(1)(A)(i); §6517(c)(2)(A)(i); §6518(m)(4)].

In the Technical Review performed in 2020 a review of environmental studies of the last 30 years found that lignin sulfonates are nontoxic at the concentration used. In fact, it was stated that worker safety is improved with the use of lignins as dust suppressants in preventing dust inhalation when workers dispense fertilizers, and also obviates the need for wearing respirators. 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 product and the same would be expected for lignin carbonates.

5. Discuss any effects the substance may have 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. [§6518(m)(5)]

The use of the petitioned substance is for dust control in the context of a plant or soil amendment and as such, is applied to the soil at relatively low rates. As the Technical Report stated, this consideration with the potential effects of lignin to increase soil aggregate size and water retention and enhance microbial activity, suggest that its use as petitioned is likely to be benign and may even be ecologically beneficial.

6. Are there any adverse impacts on biodiversity? (§205.200)

At the rates this substance is applied, no adverse impacts on biodiversity are expected.

Category 3: Alternatives/Compatibility

1. Are there alternatives to using the substance? Evaluate alternative practices as well as non-synthetic and synthetic available materials. [§6518(m)(6)]

OMRI has 11 products listed in the category of "Dust Suppressants" and another 29 in the category of "Lignin Sulfonates." Many of these products contain wax emulsions or combinations of oil and wax emulsions. Also vegetable oils, magnesium or calcium chloride solutions, glycerin and natural fatty acids are also used. Their effectiveness over time may decrease as oils volatilize or become adsorbed in fertilizer particles and waxes and oils have limited binding capacity. Other nonsynthetic fibrous materials have been suggested and include wood flour, peat moss, compost, manure, cotton, straw and clay. Dust suppression for roads can also include management practices such as maintaining vegetative cover in non-traffic areas, mulching, application of stone or gravel to disturbed roads and air current barriers such as trees. In reviewing the petition, the Crop Subcommittee feels that there is no need to add another synthetic lignin product for dust suppression since numerous lignin alternatives already are available for use.

2. In balancing the responses to the criteria above, is the substance compatible with a system of sustainable agriculture? [§6518(m)(7)]

Yes, sodium carbonate lignin, when used in fertilizer as a dust suppressant, allows finer particles to be produced. These smaller particles allow faster breakdown and with moisture, more immediate nutrients are available to plant life. Additionally, removing lignins from the paper pulping industry and repurposing them to organic farming use prevents a source of lignin contamination in discharge in wastewater. However, given that there are viable alternatives already on the National List, the Crops Subcommittee feels that there is no need to add another synthetic lignin product for dust suppression.

Classification Motion:

Motion to classify sodium carbonate lignin as synthetic

Motion by: Rick Greenwood

Seconded by: Dave Mortensen

Yes: 6 No: 0 Abstain: 0 Absent: 2 Recuse: 0

National List Motion:

Motion to add sodium carbonate lignin at 205.601 (j)(4)

Motion by: Rick Greenwood

Seconded by: Steve Ela

Yes: 0 No: 6 Abstain: 0 Absent: 2 Recuse: 0

Approved by Jesse Buie, Crop Subcommittee Chair, to transmit to NOP August 4, 2020