BEYOND PESTICIDES
701 E Street, SE ▪ Washington DC 20003
202-543-5450 phone ▪ 202-543-4791 fax
info@beyondpesticides.org ▪ www.beyondpesticides.org

April 3, 2015

Ms. Michelle Arsenault
National Organic Standards Board
USDA-AMS-NOP
1400 Independence Ave. SW.,
Room 2648-S, Mail Stop 0268
Washington, DC 20250-0268

Re. CS: Aquatic plant extracts; elemental sulfur; humic acids; lignin sulfonate; magnesium sulfate; micronutrients: soluble boron products, sulfates, carbonates, oxides, or silicates of zinc, copper, iron, manganese, molybdenum, selenium, and cobalt; liquid fish products; vitamins B1, C, E.

These comments to the National Organic Standards Board (NOSB) on its Spring 2015 agenda are submitted on behalf of Beyond Pesticides. Founded in 1981 as a national, grassroots, membership organization that represents community-based organizations and a range of people seeking to bridge the interests of consumers, farmers and farmworkers, Beyond Pesticides advances improved protections from pesticides and alternative pest management strategies that reduce or eliminate a reliance on pesticides. Our membership and network span the 50 states and groups around the world.

General comments

All of these substances are synthetic materials that feed plants directly –or, in some cases, provide other growth promotion functions. It is inconsistent with organic production practices to use synthetic materials for these uses.

Current listings:

§205.601 (j) As plant or soil amendments.
(1) Aquatic plant extracts (other than hydrolyzed)—Extraction process is limited to the use of potassium hydroxide or sodium hydroxide; solvent amount used is limited to that amount necessary for extraction.
(2) Elemental sulfur.
(3) Humic acids—naturally occurring deposits, water and alkali extracts only.
(4) Lignin sulfonate—chelating agent, dust suppressant.
(5) Magnesium sulfate—allowed with a documented soil deficiency.
(6) Micronutrients—not to be used as a defoliant, herbicide, or desiccant. Those made from nitrates or chlorides are not allowed. Soil deficiency must be documented by testing.
(i) Soluble boron products.

(ii) Sulfates, carbonates, oxides, or silicates of zinc, copper, iron, manganese, molybdenum, selenium, and cobalt.
(7) Liquid fish products—can be pH adjusted with sulfuric, citric or phosphoric acid. The amount of acid used shall not exceed the minimum needed to lower the pH to 3.5.
(8) Vitamins, B_1, C, and E.

Aquatic plant extracts

Aquatic plant extracts do not meet the criteria under OFPA. They pose some environmental hazard, are not essential, and are not compatible with organic production.

Aquatic plant extracts pose environmental hazards.

The hazards to the environment depend on the particular product. Some products use sodium hydroxide and may lead to salt build up from use. Conversely, those products that are not neutralized may harm plants. Environmental contamination can result from improper disposal of alkalis used in extraction. Overuse may lead to eutrophication in streams receiving runoff. Overharvesting of seaweeds may occur.[1]

Synthetic aquatic plant extracts are unnecessary.

The aquatic plant extracts allowed by this listing are synthetic. According to the technical review, natural extracts are available. In addition the following natural products may be used: manure, blood meal, bone meal, compost, feather meal, guano, compost tea, and other nonsynthetic animal or plant products.[2] Alternative practices include use of compost, cover crops, and manure, in addition to reduced tillage, avoiding compaction, and maintaining soil cover with plants and/or mulches.[3]

Synthetic aquatic plant extracts are incompatible with organic practices.

Synthetic aquatic plant extracts do not fit into any of the categories of OFPA §6517(c)(1)(B)(i) of allowable synthetic inputs. Synthetic aquatic plant extracts are a synthetic product, with nonsynthetic versions available, as well as natural alternative materials and methods. They are synthetic growth promoters.[4]

Elemental sulfur

Elemental sulfur does not meet the OFPA criteria of health and environmental safety, essentiality, and compatibility with organic production systems. Sulfur is listed for pesticidal uses as well as soil amendment:
205.601(e)(5) - As insecticides (including acaricides or mite control).
205.601(i)(10) - As plant disease control.
205.601(j)(2) - As plant or soil amendments.

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[1] TR lines 254-262; 275-277.
[2] TR lines 335-339.
[3] TR lines 362-364.
[4] TR lines 287-290.

The need for sulfur has not been demonstrated in NOSB decision documents.
Sulfur may be needed for one or more of the three listed uses, but the TAP reviews, minutes, and NOSB recommendations do not give a justification for the need. Since essentiality is one of the criteria that must be met for synthetic materials to be used in organic production, the NOSB must document the need.

Sulfur has significant health and environmental impacts.
Sulfur poses a threat to farmworkers. It was the cause of the most agriculture-related acute illnesses in California between 1984 and 1990. Drift of the dust may harm humans, plants, and aquatic systems. In addition, its manufacture is associated with sulfur dioxide pollution.

In 2011, the NOSB demonstrated concern over worker protection by including language in the narrative portion of the recommendation on coppers:
The Committee will work with the National Organic Program to advance guidance that ensures that organic operations are strictly meeting, and to the extent possible, exceeding the standards established by the product label in meeting principles of sustainability and a sustainable work environment for all those who work in organic production.

<u>This never happened.</u> Since the NOP has not taken action to advance such guidance and has taken action to limit NOSB workplans to consideration of petitions for and reviews of National List materials, we ask that the NOSB recommend the inclusion of language protecting workers in the listings for sulfur. According to EPA, "The WPS (Worker Protection Standard) requires that owners and employers on agricultural establishments provide protections to workers and handlers from potential pesticide exposure, train them about pesticide safety, and provide mitigations in case exposures may occur." Since sulfur may be one of the most hazardous materials for workers used in organic production, this is an appropriate place to stress the importance of appropriate Personal Protective Equipment and compliance with EPA's Worker Protection Standard. We suggest this worker protection annotation, "Steps to meet worker protection standards must be documented in the Organic System Plan."

Sulfur has a negative impact on agroecosystems.
Sulfur has adverse impacts on predators and parasites. Specifically, its impacts are rated "Low to High" to predatory mites, "High" to parasitoids, and "Low to Moderate" to general predators.[5] These impacts make its use incompatible with organic production systems.

Conclusion
The NOSB must make a case for the need for sulfur in organic production, protect workers who use it, and ensure that its use does not result in ecological imbalance. These measures may require annotation of the listings in order to ensure that OFPA criteria are met. The NOP's sunset policy does not allow this change to be made as part of the sunset process. Therefore, the NOSB must make the change through a two-stage process of removing the

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[5] UC Davis, IPM Online, Sulfur http://www.ipm.ucdavis.edu/TOOLS/PNAI/pnaishow.php?id=67 1/12/2015

listing and creating a new listing. The USDA Office of General Counsel has previously ruled that a petition is not necessary for this process. In fact, the first National List did not arise based on petitions.[6]

Humic acids

Humic acids do not meet the criteria under OFPA. They environmental hazards in extraction, are not essential, and are not compatible with organic production.

The extraction/manufacture of humic acids has negative impacts on human health and the environment.

Humic acids are derived from low grade coal, usually obtained by surface mining, which causes widespread damage to the air, land, and water. In addition, exposure to people living in areas where lignite is mined, through dust or water pollution is relevant given the connection, noted in the Technical Review for oxidized lignite and humic acid derivatives (TR), between lignite exposure and kidney failure and renal cancer.[7]

Humic acids are not essential for organic production.

Humic acids are produced by the decomposition of organic material. As noted in the TR, "Compost, cover crops, manure, mulch, and other natural sources of organic matter can all increase humic acid content of the soil."[8]

Humic acids are not compatible with organic production.

As mentioned in the TR, "Humic acid derivatives, including oxidized lignite, do not explicitly fall into any of the categories for production found in 7 USC 6517(c)(1)(B)(ii)."[9] Therefore, they (including the alkali-derived humic acids) are not eligible for listing on the National List. In addition, it is profoundly contrary to organic principles to use a fossil-fuel-derived substance as a substitute for such fundamental organic practices as the use of compost, cover crops, manure and organic mulch.

Conclusion

In the fall of 2012, the NOSB denied the petition for oxidized lignite, saying that humic acids derived from coal by oxidation with hydrogen peroxide should not be listed because of environmental and health impacts, lack of essentiality, and incompatibility with organic production. The same reasoning could be applied to humic acids derived from coal by treatment with alkali, and humic acids should be delisted.

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[6] The November 2009 NOSB recommendation on chlorhexidine said, "In terms of the board recommending a substance to be added to the national list without a petition, (An OGC person sees) nothing in the OFPA or NOP regulations that would prohibit such action. (Another OGC person) agrees as well, and indicated that he believes the original NL was created by the board without any petitions. In either event, it would seem like the board's primary function is to make recommendations concerning the NL (to add, remove, renew, etc.) and that petitions are just one mechanism through which the board can make such recommendations." http://www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELPRDC5081492&acct=nosb

[7] TR lines 319-323.

[8] TR lines 491-498.

[9] TR lines 236-237.

Lignin sulfonate

The use of lignin sulfonate as a chelating agent and dust suppressant does not meet the requirements of OFPA. In addition to the listing above for use as a chelating agent and dust suppressant, lignin sulfonate is also listed on §205.601(l) as a flotation agent. The Organic Trade Association has petitioned to remove that listing because it is no longer needed. We support the OTA petition.

Lignin sulfonate manufacture and use results in environmental damage.

Lignin sulfonate is a by-product of paper pulping. Pulp and paper is the third largest industrial polluter to air, water, and land in both Canada and the United States, and releases well over 100 million kg of toxic pollution each year.[10] Lignin sulfonates used as dust suppressants or in chelates applied as plant nutrients to the soil may contaminate waterways via runoff following a rain event, resulting in high biological oxygen demand in decomposing, which depletes oxygen for aquatic animals. The use of large amounts of lignin sulfonate can acidify the soil.[11]

Lignin sulfonate is not necessary.

Magnesium chloride is a natural substance that may be used for dust suppression, and nonsynthetic amino acids and citric acid may be used as chelation agents.[12] Dust may also be controlled by vegetative cover, windbreaks, mulch, sprinkling with water; stone or gravel on roads, or surface roughening at angles perpendicular to prevailing winds.[13] And, according to the Technical Review, "Naturally-occurring chelates in the soil include humates, fulvates, and organic root exudates. Fulvates and humates are found naturally in most soils as the result of the decomposition of organic matter. Management practices, including no-till farming or manure applications, can increase organic matter in the soil and thereby increase the rate of naturally-occurring chelates."[14]

Lignin sulfonate is incompatible with organic practices.

Lignin sulfonate is a synthetic material that is used in place of sound organic practices such as creation of hedgerows/windbreaks, mulching, vegetative cover, and building organic soil through the introduction of compost. The alternative practices also serve to support biodiversity on the farm.

Conclusion

Since lignin sulfonate does not meet any of the OFPA criteria of freedom from health and environmental harm, essentiality, and compatibility with organic practice, we recommend that it be removed from the National List.

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[10] TR lines 239-258.
[11] TR lines 332-337.
[12] TR lines 498-547.
[13] TR lines 567-575.
[14] TR lines 585-590.

Magnesium sulfate

Magnesium sulfate is allowed as a synthetic plant nutrient –generally applied to leaves—in the case of documented soil deficiency. Magnesium should not be deficient in biologically active soils. It is the central atom in chlorophyll, so any soils that have decayed leafy vegetation added as compost, mulch, or crop residues will contain magnesium as a result of the decay of the organic matter. In addition, nonsynthetic magnesium is available as langbeinite and dolomite.

Synthetic magnesium sulfate is not necessary in organic agriculture.

Magnesium deficiency should not occur in biologically active soils, and adding any one mineral risks unbalancing soil nutrients. In addition, it appears that nonsynthetic magnesium is available as langbeinite and dolomite.[15]

Synthetic magnesium sulfate is not compatible with organic production.

Synthetic magnesium sulfate is a synthetic plant nutrient, and hence its use as a foliar spray is contrary to the organic philosophy of feeding the soil to feed the plants. Magnesium should be abundant in biologically active soils, so organic soil-building practices should be used to enrich soils with magnesium.

Conclusion

Magnesium sulfate should be allowed to sunset. Synthetic plant nutrients should not be taking the place of organic soil-building practices.

Micronutrients: Soluble boron products; Sulfates, carbonates, oxides, or silicates of zinc, copper, iron, manganese, molybdenum, selenium, and cobalt

This listing covers a number of materials, and the coverage by the existing technical review is uneven, with much attention to nickel, not covered by this listing. It does not address the manufacturing (mining) impacts of these materials at all. We offer some comments below, but suggest that the Crops Subcommittee address each micronutrient, looking at manufacturing impacts, essentiality, and compatibility of each.

Synthetic micronutrients pose hazards for humans and the environment.

Agricultural use is a source of contamination by some metals, like copper[16] and selenium.[17] Micronutrients are generally applied as complexes with a chelating agent. Some synthetic chelating agents such as ETDA may cause the loss of other components in soil by complexing those components and making those components soluble in water.[18] The uptake of some micronutrients may be suppressed by the excess of others.[19] The toxic effect of one may be enhanced by another.[20] Some forms may bind to soil, and others may be more soluble and leach into water. "Once metals are introduced and contaminate the

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[15] TAP, p. 4. TR, lines 427-447.
[16] ATSDR, Toxicological Profile for Copper. P. 123. http://www.atsdr.cdc.gov/ToxProfiles/tp132.pdf
[17] http://en.wikipedia.org/wiki/Selenium_pollution.
[18] TR lines 484-487.
[19] TR lines 513-514.
[20] TR line 521.

environment, they will remain. Metals do not degrade like carbon-based (organic) molecules. The only exceptions are mercury and selenium, which can be transformed and volatilized by microorganisms. However, in general it is very difficult to eliminate metals from the environment."[21]

The source of most micronutrients is mining. The environmental impact of mining includes erosion, formation of sinkholes, loss of biodiversity, and contamination of soil, groundwater, surface water by chemicals from mining processes.[22] "[C]ommercial micronutrients are generally manufactured as by-products or intermediate products of metal mining and processing industries."[23] "The production for sulfidic zinc ores produces large amounts of sulfur dioxide and cadmium vapor. Smelter slag and other residues of process also contain significant amounts of heavy metals."[24] "The major sources of release [of copper] are mining operations, agriculture, sludge from publicly-owned treatment works (POTWs) and municipal and industrial solid waste."[25] Iron mining has been identified as a source of water and air pollution.[26] Manganese has been identified in at least 869 of the 1,699 hazardous waste sites that have been proposed for inclusion on the EPA National Priorities List.[27] Molybdenum occurs in natural waters and may be present in concentrations of several hundred micrograms per liter or higher in ground and surface water near mining operations or ore deposits.[28] "Sources of [selenium] pollution include waste materials from certain mining, agricultural, petrochemical, and industrial manufacturing operations."[29] Areas around cobalt mining operations contain hundreds to thousands times the concentration of cobalt that are found in most soils.[30] Borax mining degrades the landscape, pollutes air and water, and requires large inputs of energy and water.[31]

These are heavy metals and are toxic in large amounts.[32] Heavy metals disrupt metabolic functions in two ways: (1) They accumulate and thereby disrupt function in vital organs and glands such as the heart, brain, kidneys, bone, liver, etc. (2) They displace the vital nutritional minerals from their original place, thereby hindering their biological function. It is, however, impossible to live in an environment free of heavy metals. There are many

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[21] USDA-NRCS, Heavy Metal Soil Contamination, p. 3. ftp://ftp-fc.sc.egov.usda.gov/IL/urbanmnl/appendix/u03.pdf
[22] http://en.wikipedia.org/wiki/Environmental_impact_of_mining.
[23] TR lines 323-324.
[24] http://en.wikipedia.org/wiki/Zinc.
[25] ATSDR, Toxicological Profile for Copper. P. 123. http://www.atsdr.cdc.gov/ToxProfiles/tp132.pdf
[26] Cory McDonald1, Brandy Baker-Muhich, Tom Fitz, Paul Garrison, Jordan Petchenik, Paul Rasmussen, Robert Thiboldeaux, William Walker, and Carl Watras, 2013. Taconite Mining in Wisconsin: A Review. http://media.jrn.com/documents/Iron-Mining-Review-011014.pdf.
[27] ATSDR, Toxicological Profile for Manganese, p. 403. http://www.atsdr.cdc.gov/ToxProfiles/tp151.pdf.
[28] EPA Region 6, ATSDR and CDC Health Effects and Toxicological Profiles. http://www.epa.gov/region6/6sf/newmexico/homestake_mining/appendix-d.pdf.
[29] http://en.wikipedia.org/wiki/Selenium_pollution.
[30] ATSDR, Public Health Statement for Cobalt. http://www.atsdr.cdc.gov/phs/phs.asp?id=371&tid=64.
[31] "How Green are Boron Cleansers?" Scientific American, 2009. http://www.scientificamerican.com/article/how-green-are-boron-cleansers/.
[32] TR lines 489-491.

ways by which these toxins can be introduced into the body such as consumption of foods, beverages, skin exposure, and the inhaled air.[33] Boric acid is a reproductive toxicant and suspected endocrine disruptor.[34] Use of these materials as micronutrients may result in inhalation exposure, and risk levels may not be known for such exposures.[35]

Synthetic micronutrients may not be needed.
Other sources of micronutrients include naturally occurring minerals, which may require weathering or biological action to release nutrients.[36] "Metal-accumulator plants may be grown on some metal-rich soil and the harvest may be used as nutrient source for different locations. This might provide a slow-releasing source of nutrients in a long term, but may not be a quick remediation for nutrient deficiency problems."[37] Other practices that can eliminate the need for micronutrients include pH adjustment, balancing nutrients, use of manure, crop rotations, and use of accumulators.[38]

The use of synthetic micronutrients is incompatible with organic production.
In an organic system, nutrients are provided by the soil, and the farmer feeds the soil natural organic and mineral materials. If synthetic micronutrients are to be used at all, it must be as an exception and in concert with soil building practices that restore the mineral balance naturally.

Conclusion
The Crops Subcommittee must bring to the NOSB a proposal that is based on examining all of the allowed synthetic micronutrients and their chelating agents in light of OFPA criteria.

Liquid fish products

Liquid fish products remove valuable nutrients from marine ecosystems and may harm agroecosystems.
While some liquid fish products are made from fish waste,[39] others are made from whole fish harvested for the purpose.[40] Fish that do not have commercial value may have ecological value.[41] Use of discarded fish parts as fertilizer may also remove food from marine ecosystems.[42]

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[33] Singh, R., Gautam, N., Mishra, A., & Gupta, R. (2011). Heavy metals and living systems: An overview. *Indian Journal of Pharmacology*, *43*(3), 246–253. doi:10.4103/0253-7613.81505. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3113373/.
[34] NCAP factsheet, Boric Acid. http://www.pesticide.org/get-the-facts/pesticide-factsheets/factsheets/boricacid.
[35] See for example, ATSDR, Toxicological Profile for Copper. P. 16. http://www.atsdr.cdc.gov/ToxProfiles/tp132.pdf .
[36] TR lines 376-420.
[37] TR lines 876-878.
[38] TR lines 876-878; 941-974.
[39] Eg, http://www.neptunesharvest.com/info.html.
[40] Eg, http://www.rainyside.com/resources/fishfert.html.
[41] http://discovermagazine.com/2001/sep/featfish/?searchterm=menhaden.
[42] http://www.scotsman.com/news/environment/ban-on-fishing-discards-may-damage-ecosystem-1-3408818.

Acids used to manufacture liquid fish products may cause harm to the environment if misused or improperly disposed. Some liquid fish products are acidic, and too strong a solution can burn plants.[43] Fish products may contain persistent, bioaccumulative toxic chemicals that can affect crops and livestock over the long term.[44]

Synthetic liquid fish products are not essential.

Fish may be preserved naturally. The technical review says,[45]

> [An] option is to ferment the fish and fish waste by adding a carbohydrate source, such as molasses, along with *Lactobacilli* starter culture (lactic acid producing bacteria). *Lactobacilli* convert sugar into lactic acid, which preserves the fish and creates favorable conditions for the production of silage. Some types of *Lactobacilli* produce other substances in addition to acid, such as antibiotics or bacteriocins, which help to limit the growth of spoilage bacteria. To obtain the optimum temperature of the fermentation process (25° to 30°C) additional heating may be required during certain times of the year (Archer, 2001). Fish hydrolysate also can be pasteurized in a dehydrator or spray-dryer to form spray-dried fish hydrolysate.

In addition, other natural materials that could substitute for synthetic fish products are manure, compost, aquatic plant products, blood meal, bone meal, compost, feather meal, kelp meal, guano, and other nonsynthetic animal or plant products.[46]

Synthetic liquid fish products are incompatible with organic production.

In an organic system, nutrients are provided by the soil, and the farmer feeds the soil natural organic and mineral materials. If synthetic nutrients are to be used at all, it must be as an exception and in concert with soil building practices that restore the soil balance naturally.

Conclusion

Liquid fish products should be removed from the National List because they remove valuable nutrients from marine or aquatic ecosystems and are incompatible with organic production.

Vitamin B1, C, E

According to the 1995 TAP review, the antioxidant vitamins C and E are used as foliar sprays and dips for pest control. Vitamin B1 is used to stimulate rooting in cutting. The available documentation does not provide support for this listing in reference to OFPA criteria, except to state that they break down quickly and are non-toxic to plants and humans in the amounts used.

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[43] TR lines 173-181.

[44] José G. Dórea, 2008. Persistent, bioaccumulative and toxic substances in fish: Human health considerations. Science of the Total Environment, Volume 400, Issues 1–3, 1 August 2008, Pages 93–114. http://www.sciencedirect.com/science/article/pii/S0048969708006748

[45] TR lines 143-150.

[46] TR lines 239-246.

Synthetic vitamins B1, C, and E are incompatible with organic production.
The available documentation does not state the purpose of applying vitamins C and E to plants. However, the literature shows that the use is as a plant growth promoter.[47] The TAP review stated that vitamin B1 is used to stimulate rooting in cuttings. Synthetic growth promoters and growth hormones are not compatible with organic production. The technical review for indole-3-butyric acid (IBA) lists a large number of natural materials and other methods for rooting plants. As mentioned in the technical review for aqueous potassium silicate, silicates can play a plant-protective role and can be increased in plants through the use of silica-rich plants in compost and careful recycling of compost and manure. Organic practices such as variety selection, soilscape, sanitation, crop rotation, and mulches all contribute to disease resistance.

Conclusion
Vitamins B1, C, and E should be delisted.

Thank you for your consideration of these comments.

Sincerely,

Terry Shistar, Ph.D.
Board of Directors

[47] Ibrahim, Z. R. (2013). Effect of Foliar Spray of Ascorbic Acid, Zn, Seaweed Extracts (Sea) Force and Biofertilizers (EM-1) on Vegetative Growth and Root Growth of Olive (Olea Europaea L.) Transplants cv. HojBlanca. *Int. J. Pure Appl. Sci. Technol*, *17*(2), 79-89. "[There is a widespread use of antioxidants especially ascorbic acid for enhancing the growth and productivity of fruit trees." Nour, K. A. M; Mansour, N. T. S. and Eisa G. S.A., 2012.
Effect of Some Antioxidants on Some Physiological and Anatomical Characters of Snap Bean Plants under Sandy Soil Conditions. New York Science Journal 5(5):1- 9. Vitamin E had a significant effect on number of leaves/plant, total dry weight/plant, plant height, number of leaves and dry weight/plant.