National Organic Standards Board
Livestock Subcommittee
Petitioned Material Checklist
Micronutrients for use in aquatic plant production

+February 3, 2014

Summary of Proposed Action:
Micronutrients are proposed to be added to the National List at 205.609 for use in aquatic plant production. Section 205.609 of the National List will contain the list of synthetic substances allowed in organic aquatic plant production.

There are 18 to 21 elements (depending on the plant) considered essential for plants to properly grow and develop. Three come from air and water (C, H, O) and the rest must be otherwise supplied. Three are considered primary nutrients (N, P, K), three are considered secondary nutrients (Ca, Mg, S) and the other 12 are considered micronutrients: Fe, B, Cu, Cl, Mn, Mo, Zn, Co, Ni, Na, Se and Cr. Micronutrients are needed by plants at 10 to 100,000 times lower concentrations than primary nutrients.

Previous to the development of micronutrient media for plant aquaculture systems, it was common practice to add aqueous extracts of soil to culture water to supply micronutrients. Today, there are available micronutrient mixtures – such as the Guillard f/2 media – that are commonly added to culture water to supply micronutrients for plant aquaculture. These micronutrient mixtures generally supply six micronutrients: Fe, Cu, Zn, Co, Mn and Mo. However, "deficiencies of one or more additional micronutrients may develop depending upon the source of growing water and the species of aquatic plant in culture" (petition, p.2).

All micronutrients are allowed for use in terrestrial organic crop production with the exception of those containing nitrate or chloride. In terrestrial agriculture, chloride is avoided to avoid salt buildup in the soil. However, in aquaculture, "most water sources, including marine, brackish and fresh water contain much larger amounts of chloride salts than would be added by these nutrients at the very low levels employed" (petition, p. 6). None of the micronutrient formulations listed in the 2010 Micronutrient Technical Report for crop production (lines 59-95) contain nitrate, although several of them contain ammonium (a nitrogen-containing ion). However, at the low levels trace minerals are used at, the amount of nitrogen added with nitrogen-containing micronutrient supplements would be very small.

In terrestrial organic crop production, soil testing is required to document deficiencies before micronutrients can be applied. In aquatic plant production, micronutrients are generally added to culture media at the outset and supplemented occasionally, and "testing of dissolved ionic forms of micronutrients at very low concentrations, other than ferric ions, is extremely difficult or prohibitively expensive" (petition, p.4).

It should be noted that at the time of drafting this proposal there are no federal standards promulgated for aquatic plant or animal production and this proposal is based on the NOSB Recommendations voted in 2007, 2008 and 2009.

Evaluation Criteria (see attached checklist for criteria in each category)

	Criteria Satisfied?		
1. Impact on Humans and Environment	☒ Yes	☐ No	☐ N/A
2. Essential & Availability Criteria	☒ Yes	☐ No	☐ N/A
3. Compatibility & Consistency	☒ Yes	☐ No	☐ N/A

Substance Fails Criteria Category: [ ] **Comments:** NA

Subcommittee Action & Vote,

Classification Motion: Move to classify micronutrients as petitioned for aquatic plants as synthetic
Motion by: Francis Thicke
Seconded by: C. Reuben Walker
Yes: 7 No: 0 Absent: 0 Abstain: 0 Recuse: 0

Listing Motion: Motion to list micronutrients at §205.609 with the following **annotation**: For non-vascular plants only.

Motion by: Francis Thicke
Seconded by: C. Reuben Walker
Yes: 7 No: 0 Absent: 0 Abstain: 0 Recuse: 0

Basis for annotation: x☐ To meet criteria above ☐ Other regulatory criteria ☐ Citation
Notes:

Approved by Tracy Favre, Subcommittee Chair, to transmit to NOSB February 3, 2014

NOSB Evaluation Criteria for Substances Added To the National List: Crops

Category 1. Adverse impacts on humans or the environment? Micronutrients for use in aquatic plant production

Question	Yes	No	N/A	Comments/Documentation (TAP; petition; regulatory agency; other)
1. Is there a probability of environmental contamination during use or misuse? [§6518(m)(3)]		X		Because micronutrients are used at very low concentrations there is little probability of environmental contamination. Petition (pg.4): “any residual trace elements released into environment will be extremely low concentrations below any physiologically significant level, & will be rapidly absorbed by microorganisms.”

2. Is there a probability of environmental contamination during, manufacture or disposal? [§6518(m)(3)]		X		Little specific information is available on micronutrient manufacturing in either the petition or TR, other than that micronutrients are manufactured in many different ways. TR line 323: "Commercial micronutrients are generally manufactured as by-products or intermediate products of metal mining and processing industries." Petition, page 3: "various trace minerals are obtained from sources in a number of countries, including China. Manufacturing processes are proprietary."
3. Are there any adverse impacts on biodiversity? (§205.200)		X		Crops TR line 534: "Micronutrients are essential for normal plant growth, but levels above that required for good growth can be toxic and suppress plant growth, and may cause adverse biological or chemical interactions in the agro-ecosystem." However, there would be no incentive to add micronutrients at higher-than-needed levels for aquatic plant production.
4. Does the substance contain inerts classified by EPA as 'inerts of toxicological concern'? [§6517 (c)(1)(B)(ii)]		X		
5. Is there potential for detrimental chemical interaction with other materials used in organic farming systems? [§6518(m)(1)]		X		TR 504-508: reactivity of micronutrients is low towards other chemicals/substances, these components exist naturally in soil; must follow application rates. As noted above, there would be no incentive to apply at rates higher than necessary.
6. Is there a toxic or other adverse action of the material or its breakdown products? [§6518(m)(2)]		X		TR 656-659: micronutrients may be applied as different compounds-most applied micronutrients are simple ionic forms & will not breakdown any further.
7. Is there persistence or concentration of the material or breakdown products in the environment? [§6518(m)(2)]		X		As noted above, micronutrients are simple ions that will not break down further, and they are applied at very low levels, which should be expected to be mostly consumed by the plants.
8. Would the use of the substance be harmful to human health or the environment? [§6517 (c)(1)(A)(i); §6517 (c)(2)(A)(i); §6518(m)(4)]		X		The micronutrients used in aquatic plant production are also essential elements in humane nutrition, so at the levels used they will not be harmful to human health.

9. Are there adverse biological and chemical interactions in the agro-ecosystem? [§6518(m)(5)]		X		TR 545: toxicity could occur if micronutrients are applied in excess. However, in aquatic plant systems they are used at very low levels
10. Are there detrimental physiological effects on soil organisms, crops, or livestock? [§6518(m)(5)]		X		See #9 above.

Category 2. Is the Substance Essential for Organic Production? Micronutrients for use in aquatic plant production

Question	Yes	No	N/A	Comments/Documentation (TAP; petition; regulatory agency; other)
1. Is the substance agricultural? [§6502(1)]		X		
2. Is the substance formulated or manufactured by a chemical process? [§6502(21)]	X			TR line 323: "Commercial micronutrients are generally manufactured as by-products or intermediate products of metal mining and processing industries."
3. Is the substance formulated or manufactured by a process that chemically changes a substance extracted from naturally occurring plant, animal, or mineral sources? [§6502(21)]	X			Micronutrients are manufactured in a wide variety of ways, generally involving chemical change of mineral sources.
4. Is the substance created by naturally occurring biological processes? [§6502(21)]		X		See #2 above.
5. Is there a natural source of the substance? [§ 205.600(b)(1)]		X		TR line 867: Most naturally available minerals of micronutrient components not soluble or are only very slowly soluble in water.
6. Is there an organic substitute? [§205.600(b)(1)]		X		Minerals are inorganic
7. Is there a wholly natural substitute product? [§6517(c)(1)(A)(ii)]		X		See #5.
8. Are there any alternative substances? [§6518(m)(6)]		X		Micronutrients are essential elements for plant growth. There are no alternatives
9. Are there other practices that would make the substance unnecessary? [§6518(m)(6)]		X		In some cases, recirculating water from other ecological systems could make adding micronutrients unnecessary.

NOSB Evaluation Criteria for Substances Added To the National List: Crops/Livestock

Category 3. Is the substance compatible with organic production practices? Micronutrients for use in aquatic plant production

Question	Yes	No	N/A	Comments/Documentation (TAP; petition; regulatory agency; other)
1. Is the substance consistent with organic farming and handling? [§6517(c)(1)(A)(iii); 6517(c)(2)(A)(ii)]	X			
2. Is the substance compatible with a system of sustainable agriculture? [§6518(m)(7)]	X			
3. If used in livestock feed or pet food, Is the nutritional quality of the food maintained with the substance? [§205.600(b)(3)]			X	
4. If used in livestock feed or pet food, Is the primary use as a preservative? [§205.600(b)(4)]			X	
5. If used in livestock feed or pet food, Is the primary use to recreate or improve flavors, colors, textures, or nutritive value lost in processing (except when required by law)? [§205.600(b)(4)]			X	
6. 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	X			
toxins derived from bacteria		X		
pheromones, soaps, horticultural oils, fish emulsions, treated seed, vitamins and minerals	X			
livestock parasiticides and medicines		X		
production aids including netting, tree wraps and seals, insect traps, sticky barriers, row covers, and equipment cleansers	X			