

**National Organic Standards Board (NOSB)
Crops Subcommittee Report
Contaminated Input Plan
February 24, 2015**

A Plan for Contaminated Inputs

Colehour Bondera (Jay Feldman, previous NOSB member, assisted with earlier drafts)
NOSB/Crops Subcommittee

Overview

The NOP regulations at §205.203 require organic producers to add organic materials, while avoiding contamination with substances prohibited in organic production (emphasis added):

§205.203 Soil fertility and crop nutrient management practice standard.

(a) The producer must select and implement tillage and cultivation practices that maintain or improve the physical, chemical, and biological condition of soil and minimize soil erosion.

(b) The producer must manage crop nutrients and soil fertility through rotations, cover crops, and the application of plant and animal materials.

(c) The producer must manage plant and animal materials to maintain or improve soil organic matter content in a manner that does not contribute to contamination of crops, soil, or water by plant nutrients, pathogenic organisms, heavy metals, or residues of prohibited substances.

Animal and plant materials include:

- (1) Raw animal manure, which must be composted unless it is:
 - (i) Applied to land used for a crop not intended for human consumption;
 - (ii) Incorporated into the soil not less than 120 days prior to the harvest of a product whose edible portion has direct contact with the soil surface or soil particles; or
 - (iii) Incorporated into the soil not less than 90 days prior to the harvest of a product whose edible portion does not have direct contact with the soil surface or soil particles;
- (2) Composted plant and animal materials produced through a process that:
 - (i) Established an initial C:N ratio of between 25:1 and 40:1; and
 - (ii) Maintained a temperature of between 131 °F and 170 °F for 3 days using an in-vessel or static aerated pile system; or
 - (iii) Maintained a temperature of between 131 °F and 170 °F for 15 days using a windrow composting system, during which period, the materials must be turned a minimum of five times.
- (3) Uncomposted plant materials.

Some specific impacts of concern from compost and manures derived from nonorganic operations include: heavy metals, antibiotic residues, residues of insecticides, herbicide residues, and residues of toxic chemicals that could affect soil microorganisms. The same concerns about heavy metals exist in some mined minerals, and in fish that may accumulate mercury or other metals. Concerns about pathogens often transfer over to animal by-products as well. This document and the attached spreadsheet describe the plan developed by the Crops Subcommittee for ensuring that inputs of organic matter do not result in contamination “of crops, soil, or water by plant nutrients, pathogenic organisms, heavy metals, or residues of prohibited substances.”

Our approach is to look at off-site inputs based on feedstocks/pathways. For each, ask: What contaminants might be present here? Which would survive currently prescribed requirements for composting? If there are remaining contaminants known to persist through the composting process at any level, is there a way to restrict the source so that those contaminants would not be present? (e.g., ask a farmer whether arsenic is fed to poultry.) If there are remaining contaminants, do they exceed unavoidable residual contamination levels from a historical, but not current use, of a toxic material? Are there treatments that could be applied to the compost that can eliminate those contaminants?

Where we're going...

The subcommittee is trying to prioritize future work on this subject. The attached spreadsheet starts with a feedstock/pathway of concern as an approach to how to establish these priorities. For example, we might consider manure from a conventional farm. (Into how many separate categories does this need to be separated? Is poultry vs. other enough? Poultry/horse/cattle/other?)

1. What contaminants might be present?
2. Of the contaminants that might be present, which ones are likely to survive already prescribed treatment methods?
3. Of those that are likely to survive already prescribed treatment methods, which can be treated with other (easy) removal or avoidance methods?
 - a. Use those removal or avoidance methods.
 - b. If there are other contaminants, test for them. (Figure out a fair testing requirement.)

The spreadsheet consists of ten columns, with an additional column for experts in possible contamination and remediation for each possible input. Issues under consideration, as captured in the columns of the spreadsheet, include:

1. off-farm input,
2. source,
3. components of interest,
4. likely or possible contaminants,
5. ability to persist through composting process,
6. avoidance methods,
7. environmental fate of inputs when applied to soil,
8. loading rates,
9. efficacy of remediation, and
10. testing methods.

What assistance do we need?

We need assistance identifying feedstocks/pathways and determining how to separate them into categories that can be grouped.

- Inputs from organic growers would be most helpful.
- Expert agronomists, composters, scientists from testing laboratories and other fields can guide this effort.

We need help determining which contaminants are associated with which feedstocks/pathways.

- For pesticides, searches of labels can identify those used on each input.¹
- For fertilizers, some departments of agriculture have registries of fertilizer products that contain an analysis of each product, including heavy metal contaminants.²

¹ Labels for a given use and use site can be found through a search at <http://premier.cdms.net/webapls/> Pesticide recommendations can be found through state land grant universities or extension agencies. For example, <http://content.ces.ncsu.edu/chemical-weed-control.pdf>.

² See, for example, <http://agr.wa.gov/PestFert/Fertilizers/FertDB/Product1.aspx>.

- For livestock drugs, a veterinarian or livestock expert could identify drugs given to livestock that might appear in manure.
- For feed ingredients and additives, a livestock expert could help identify the range of ingredients and additives that might be found through wasted feed or manure residues.

We need assistance determining which contaminants can be removed by currently prescribed treatment methods.

- This needs to be researched for each contaminant. A lot of research has been done on the biodegradation of some pesticides and some drugs. Composting is frequently used for bioremediation, but sometimes requires additions, including humic acids or microorganisms, that would not ordinarily be present. Mulches would not be subject to the same conditions as materials for compost.
- U.S. Composting Council can help with identifying contaminants that survive composting. Other experts in compost quality will also be consulted.
- Scientists have done research on uptake of antibiotics in crops from manure and degradation of antibiotics in manure during composting.³

We need assistance identifying questions that can be asked to avoid contaminants that will not be removed by currently prescribed treatments.

- This is a question that should be posed for public comment along with the question of which off-farm inputs are used.
- The list of contaminants that would pass through ordinary treatment will help generate questions.

We need assistance identifying additional contamination removal methods –e.g., bacterial cultures that might be added to compost; fungi that might be used for mycoremediation.

- Bioremediation⁴
- Mycoremediation: ^{5 6}

We need assistance identifying low-cost test methods, for example, bioassays with clear definitions of adverse effects.

- A bioassay for clopyralid has been developed by Washington State University and Washington State Department of Ecology.⁷

³ Kumar K, Gupta SC, Baidoo SK, Chander Y, Rosen CJ (2005) Antibiotic uptake by plants from soil fertilized with animal manure. *J Environ Qual* 34:2082–2085.

http://www.prepacvpm.org/wordpress/resources/Exam_Topics_2012/2_EnvironHealth-Toxicology/6_Waste/AnimalAgWasteManagement/Antibiotic_Uptake_Plants.pdf Dolliver, Holly, Kumar, Kuldip, Gupta, Satish, Sulfamethazine Uptake by Plants from Manure-Amended Soil. *JOENQ* 2007. 36:1224–1230.

<https://dl.sciencesocieties.org/publications/jeq/abstracts/36/4/1224> Holly Dolliver, Satish Gupta, and Sally Noll, Antibiotic degradation during manure composting. *J. Environ. Qual.* 37:1245–1253 (2008).

⁴ Pruden, Amy, DG Joakim Larsson, Alejandro Amézquita, Peter Collignon, Kristian K. Brandt, David W. Graham, James M. Lazorchak et al. "Management options for reducing the release of antibiotics and antibiotic resistance genes to the environment." *Environ Health Perspect* 121, no. 8 (2013): 878-885. <http://ehp.niehs.nih.gov/wp-content/uploads/121/8/ehp.1206446.pdf>.

⁵ <http://www.fungi.com/about-paul-stamets.html>, <http://www.fungi.com/product-detail/product/mycelium-running.html>.

⁶ Rigot, J.; Matsumura, F. Assessment of the rhizosphere competency and pentachlorophenol-metabolizing activity of a pesticide-degrading strain of *Trichoderma harzianum* introduced into the root zone of corn seedlings. *Journal of Environmental Science and Health Part B Pesticides Food Contaminants and Agricultural Wastes*. May, 2002. B37(3):201-210.

- A similar bioassay has been developed by Washington State University for aminopyralid.⁸
- North Carolina State University recommends a similar bioassay for all of the pyridine carboxylic acid herbicides –clopyralid, aminopyralid, and picloram.⁹
- Woods End Lab has also produced a bioassay for herbicide damage.¹⁰

A start

We don't need to do all those things at once. Instead, we can start with one –say, dairy cow manure. (If that's too limited, we can broaden the category.) The next step is to find experts who can help answer the above questions for dairy manure.

Meanwhile, we should also identify people who can help us identify the different categories of inputs we should work on over the course of the workplan.

While this is presented as a report on progress and direction, comments from the public are welcome and encouraged.

See table below.

Off-farm inputs	Source	Components of Interest	Possible/likely Contaminants	Persists through Composting?	Avoidance Methods	Environmental Fate in Soil	Loading Rates	Remediation	Testing Methods	Experts
Yard waste	Municipal collection or compost	Lawn clippings	Gasoline/oil from mowers	No						
			Fertilizers	Not the fertilizer ingredients, but heavy metal contaminants would persist.						
			Insecticides --label search	Some?	Ordinances restricting use					

⁷ <http://puyallup.wsu.edu/soilmgmt/Pubs/CloBioassay.pdf>.

⁸ <http://whatcom.wsu.edu/ag/aminopyralid/bioassay.html>.

⁹ http://www.ces.ncsu.edu/fletcher/programs/ncorganic/special-pubs/herbicide_carryover.pdf.

¹⁰ <https://woodsendsend.org/compost/herbicide-bioassay/>.

			Herbicides - -label search	Pyridine carboxylic acid herbicides.	Ordinanc es restrictin g use				Bioa ssay s.	US Compo sting Council
Dairy manur e	Conven tional dairy	Feces	Antibiotics, other drugs --list		Use Organic source. Other?					
			Pesticides -- label search	Pyridine carboxylic acid herbicides	Use Organic source. Other?				Bioa ssay s for herbi cide s.	
			Antibiotic resistance genes							
		Hay/ straw/ other bedding	Pesticides -- label search		Use Organic source. Other?					
		Grain/ feed	GMO grain		Use Organic source. Other?					
			Pesticides -- label search		Use Organic source. Other?					
			Feed additives		Use Organic source. Other?					
Dairy manur e	CAFO	Feces	Antibiotics, other drugs --list		Use Organic source. Other?					
			Pesticides -- label search	Pyridine carboxylic acid herbicides	Use Organic source. Other?				Bioa ssay s for herbi cide s.	
			Antibiotic resistance genes							
		Hay/ straw/ other bedding	Pesticides -- label search		Use Organic source. Other?					

		Grain/ feed	GMO grain		Use Organic source. Other?					
			Pesticides -- label search		Use Organic source. Other?					
			Feed additives		Use Organic source. Other?					Dairy manure
Poultry manure	Conven- tional poultry opera- tion	Feces	Antibiotics, other drugs --list		Use Organic source. Other?					
			Arsenic		Use Organic source. Testing.					
		Hay/ straw/ other bedding	Pesticides -- label search	Pyridine carboxylic acid herbicides	Use Organic source. Other?					
		Grain/ feed	Feed additives		Use Organic source. Other?					
Hay for mulch	Conven- tional farm	Grass	Pesticides -- label search	Pyridine carboxylic acid herbicides	Use Organic source. Other?					
Straw for mulch	Conven- tional farm	Straw from grain	Pesticides -- label search		Use Organic source. Other?					
Conven- tional food scraps for compost	Various : grocery stores, restau- rants, etc.	Vege- tables	Pesticides -- label search							USCC
		Grains	Pesticides -- label search							USCC
			GMO grain							

Newspaper, other paper mulch materials	Newspapers, scrap paper	Inks, dyes	Heavy metals
			Polycyclic aromatic hydrocarbons
		Paper	Dioxins