Sunset 2021
Meeting 2 - Review
Crops Substances §205.601, §205.602
October 2019

Introduction

As part of the Sunset Process, the National Organic Program (NOP) announces substances on the National List of Allowed and Prohibited Substances (National List) that are coming up for sunset review by the National Organic Standard Board (NOSB). The following list announces substances that are on the National List for use in organic crop production that must be reviewed by the NOSB and renewed by the USDA before their sunset dates in 2021. This list provides the substance's current status on the National List, use description, references to past technical reports, past NOSB actions, and regulatory history, as applicable.

Request for Comments

Written public comments will be accepted through October 3, 2019 via www.regulations.gov. Comments received after that date may not be reviewed by the NOSB before the October meeting.

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Note: With the exception of ferric phosphate and hydrogen chloride the materials included in this list are undergoing early sunset review as part of the November 18, 2016, NOSB recommendation on efficient workload re-organization.

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

Hydrogen peroxide (a)
Hydrogen peroxide (i)
Soaps, ammonium
Oils, horticultural (e)
Oils, horticultural (i)
Pheromones
Ferric phosphate
Potassium bicarbonate
Magnesium sulfate
Hydrogen chloride

Reference: 205.602 Nonsynthetic substances prohibited for use in organic crop production.

Ash from manure burning
Sodium fluoaluminate

Hydrogen peroxide—§205.601(a)

§205.601 Synthetic substances allowed for use in organic crop production.
Reference: 205.601(a) As algicide, disinfectants, and sanitizer, including irrigation system cleaning systems. **(4) Hydrogen peroxide.**
Technical Report(s): 1995 TAP; 2015 TR
Petition(s): N/A
Past NOSB Actions: 10/1995 NOSB minutes and vote; 11/2005 sunset recommendation -deferred; 06/2006 sunset recommendation; 10/2010 sunset recommendation 10/2015 sunset recommendation
Recent Regulatory Background: Sunset renewal notice published 06/06/12 (77 FR 33290); Renewed 03/15/2017 (82 FR 14420)
Sunset Date: 3/15/2022

Subcommittee Review:
Hydrogen peroxide is widely used as a disinfectant and bleaching agent. It is an effective and an environmentally benign substance used to reduce and control microorganisms for food safety purposes. It is critical for sanitizing aseptic packaging. It is a weak acid but a strong oxidizer and this makes it very useful as a fungicide, cleaning agent, and for disease control.

Hydrogen peroxide is a very simple molecule with a formula of H2O2. Virtually all modern production facilities manufacture commercial hydrogen peroxide solutions using large, strategically located anthraquinone autoxidation processes. Improved production methods and facilities based on the anthraquinone (AO) process have recently appeared in the commercial patent literature.

Hydrogen peroxide is a naturally occurring inorganic compound; however, the sources of hydrogen peroxide used in commercial fungicides, disinfectants and antiseptic products are produced through chemical synthesis. Industrial methods for the preparation of hydrogen peroxide are categorized as oxidation-reduction reactions. Modern commercial methods for hydrogen peroxide synthesis involve the transition-metal catalyzed chemical reduction of an alkyl anthraquinone with hydrogen (H2) gas to the corresponding hydroquinone followed by regenerative oxidation of the latter species in air.

Contamination is not expected when purified forms of hydrogen peroxide are released to the environment following normal use. At typical pesticide concentrations, hydrogen peroxide is expected to rapidly degrade to oxygen gas and water (US EPA, 2007). Large-volume spills and other releases of concentrated hydrogen peroxide could present a fire hazard since the substance readily decomposes to release oxygen gas. Pure hydrogen peroxide is not flammable and can be diluted with clean water to minimize the risk of fire. Although concentrated hydrogen peroxide is nonflammable, it is a powerful oxidizing agent that may spontaneously combust on contact with organic material and becomes explosive when heated. Combustion reactions and explosions resulting from accidental spills of concentrated hydrogen peroxide could therefore lead to environmental degradation.

A Technical Report (TR) was commissioned in 2015 for hydrogen peroxide since the information from the previous 1995 TAP was old and incomplete. It showed that hydrogen peroxide is inherently unstable and breaks down readily into oxygen and water. (TR Evaluation question 3-5). While it is toxic to disease spores and cells on contact, it has absolutely no residual effect. It has low or no impacts on birds, humans, or fish if it is used according to the label and protective application measures are taken. There can be some effects on soil microbiota in the very top layer of soil where it may come in contact, but because it breaks down so quickly, soil life is quickly restored. (TR 2015 Evaluation Question #8).

While there are some alternatives on the National List for sanitizers and disinfectants, as well as some essential oils with antiseptic properties, the National List items are not necessarily any better or safer than hydrogen peroxide, and the essential oils have not been studied to compare with Hydrogen peroxide side-by side to see if they are equally as effective and benign. (TR Evaluation question 11). Certain bacterial and fungal products that are beneficial in controlling plant diseases may be valid alternatives for some uses as a fungicide, but often these are best used as preventatives and are not effective once a disease has taken hold, and they are not good substitutes in all situations. Likewise, some biological, cultural and physical methods keep the need for use of hydrogen peroxide to a minimum, but don't apply to every situation. (TR Evaluation question 12).

In the 2015 sunset review most public comment supported keeping hydrogen peroxide on the National List. It was frequently mentioned that it is one of the few tools left against fire blight now that antibiotics cannot be used. It is widely used to clean equipment, in mushroom production, and to alternate with other materials for resistance management. No comments were put forward with new information that would contribute to the OFPA criteria review. The NOSB found the material to meet OFPA criteria and had no objection to continued listing. No significant new issues were raised by the public.

During the Spring 2019 NOSB meeting the Crops Committee received comments in favor of relisting hydrogen peroxide and no comments against relisting. Comments included the following:

- Hydrogen peroxide is an effective microbial pesticide used in the orchard setting for the sanitation of equipment such as picking bags and pruning shears. It is also used as an algicide and disinfectant, including for irrigation system cleaning.
- With the loss of antibiotics, hydrogen peroxide has become an extremely important tool in controlling fire blight in both organic apples and pears.

Subcommittee Vote:
Motion to remove hydrogen peroxide from §205.601(a) of the National List based on the following criteria in the Organic Foods Production Act (OFPA) and/or 7 CFR 205.600(b): NA
Motion by: Jesse Buie
Seconded by: Harriet Behar
Yes: 0 No: 8 Abstain: 0 Absent: 0 Recuse: 0

Hydrogen peroxide—§205.601(i)

§205.601 Synthetic substances allowed for use in organic crop production.
Reference: 205.601(i) As plant disease control. **(5) Hydrogen peroxide.**
Technical Report(s): 1995 TAP; 2015 TR
Petition(s): N/A
Past NOSB Actions: 10/1995 NOSB minutes and vote; 11/2005 sunset recommendation -deferred; 06/2006 sunset recommendation; 10/2010 sunset recommendation
10/2015 sunset recommendation
Recent Regulatory Background: Sunset renewal notice published 06/06/12 (77 FR 33290); Renewed 03/15/2017 (82 FR 14420)
Sunset Date: 3/15/2022
Subcommittee Review:
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- With the loss of antibiotics, hydrogen peroxide has become an extremely important tool in controlling fire blight in both organic apples and pears.

Subcommittee Vote:
Motion to remove hydrogen peroxide from §205.601(a) of the National List based on the following criteria in the Organic Foods Production Act (OFPA) and/or 7 CFR 205.600(b): NA
Motion by: Jesse Buie
Seconded by: Harriet Behar
Yes: 0 No: 8 Abstain: 0 Absent: 0 Recuse: 0

Soaps, ammonium

§205.601 Synthetic substances allowed for use in organic crop production.
Reference: 205.601(d) **As animal repellents—Soaps, ammonium—for use as a large animal repellant only, no contact with soil or edible portion of crop.**
Technical Report: 1996 TAP; 2019 TR
Petition(s): N/A
Past NOSB Actions: 10/1995 NOSB minutes and vote; 11/2005 sunset recommendation; 10/2010 sunset recommendation; 10/2015 sunset recommendation
Recent Regulatory Background: Sunset renewal notice published 06/06/12 (77 FR 33290); Renewed 03/15/2017 (82 FR 14420)
Sunset Date: 3/15/2022

Subcommittee Review:
Ammonium soaps are used as animal repellents to protect organically produced crops from unwanted browsing, primarily from deer and rabbits. USDA organic regulations allow ammonium soaps as a "synthetic substance allowed for use in organic crop production" at 7 CFR 205.601.

Ammonium soaps are manufactured by hydrolysis of fats (triglycerides) with an alkaline source in a saponification process. In this process, the base reacts with the fatty ester to break the ester linkages, resulting in the formation of a salt with the cation of the base and the carboxylate anion that remains at the end of the hydrolysis. A wide range of fats may be used in the saponification process, including both plant and animal fats. Because of the relative abundance of fats and their low cost, most soaps are produced by the saponification of natural fats. Ammonium cations also exist in nature and play an important role in the metabolic pathways of a range of organisms , as well as being a key component of the nitrogen cycle. Soaps, however, do not naturally exist in nature but are manufactured.

Ammonium soaps are permitted by the Canadian General Standards Board Permitted Substances List - Ammonium soaps are listed in the CAN/CGSB-32.311-2015 - Organic production systems - permitted substances lists.

Studies conducted by the EPA estimate that ammonium soaps will undergo rapid degradation in the environment, primarily through microbial metabolism, yielding an environmental half-life of less than one day. Interesting to note that the toxicological profile of the substance differs based on the environment in which it is located. They are regarded as having low toxicity to terrestrial organisms, with little impact to mammals and avian animals. The EPA has placed them in Toxicity Category IV, the lowest available classification. They are, however, moderately toxic in aquatic environments. Ammonium soaps have been classified as "highly toxic" to crustaceans by the EPA. Due to the potential toxicity to aquatic environments, ammonium soap repellent product labels stipulate "This product may be hazardous to aquatic invertebrates. Do not apply to water bodies such as ponds or creeks.

The EPA has given ammonium soaps the lowest possible toxicity classification (Toxicity Category IV). They have also concluded that the oral intake of dangerous levels of the substance is highly unlikely due to the recognizable and undesirable soap taste. Despite the low toxicity of ammonium soaps there are some health risks. They are primarily irritation-based. Occasional skin irritation upon prolonged exposure has been reported as potential problems with direct exposure in the eye.

There are some alternative methods that make the use of ammonium soaps unnecessary. They include population control of animals, alteration of habitat or physical barriers. As such, fencing is widely acknowledged as the most effective means of preventing crop damage from unintended browsing.

There are also natural (non-synthetic) substances which may be used in place of ammonium soaps. These all to have similar limitations to the soaps and include fear-based area repellents such as coyote urine, smell-based area repellents such as human hair and contact repellents that include capsaicin and black pepper oil.

There were approximately 10 comments all supporting the continued listing of ammonium soaps on the National List of Allowed and Prohibited Substances. No comments for removal were received.

Subcommittee Vote:
Motion to remove soaps, ammonium, from §205.601 of the National List based on the following criteria in the Organic Foods Production Act (OFPA) and/or 7CFR205.600(b): NA
Motion by: Rick Greenwood
Seconded by: Emily Oakley
Yes: 0 No: 7 Abstain: 0 Absent: 1 Recuse: 0

Oils, horticultural—§205.601(e)

§205.601 Synthetic substances allowed for use in organic crop production.
Reference: 205.601(e) As insecticides (including acaricides or mite control). **(7) Oils, horticultural—narrow range oils as dormant, suffocating, and summer oils.**
Technical Report: 1995 TAP; 2019 TR
Petition(s): N/A
Past NOSB Actions: 04/1995 NOSB minutes and vote; 11/2005 sunset recommendation – deferred; 06/2006 sunset recommendation; 10/2010 sunset recommendation; 10/2015 sunset recommendation
Recent Regulatory Background: Sunset renewal notice published 06/06/12 (77 FR 33290); Renewed 03/15/2017 (82 FR 14420)
Sunset Date: 3/15/2022

Subcommittee Review:
Horticultural oils have widespread use in organic fruit and vegetable production. They can be used in nearly every season and may be used alone or in mixes that include other nutrient or pest control products. Oils may be used for control of multiple plant diseases as well as acaricides, miticides, and

insecticides. According to the 2018 technical report (TR), oils have different modes of action on insects, mites and plant pathogens. They target multiple sites and not specific receptors and thus do not act like most synthetic insecticides. This action also helps to prevent resistance to their action. The multiple actions include smothering insect eggs by preventing atmospheric gas exchange, softening or disrupting insect cuticles, interfering with molting, as well as altering behaviors such as egg laying.

Horticultural oils may be called by many different names; however, the 2018 TR generally refers to them as petroleum-derived spray oils (PDSO's) or mineral oils. Their use has increased and has been refined over the last century. Recognition that different fractions of oils have higher efficacy for pest control and that the range of phytotoxic effects on the plant goes from none to high depending on the fraction used led to the selection of a narrow range of oils exhibiting the dual characteristics of being effective against pests and non-toxic to plants. They are often classified by boiling point, although modern terminology may refer to many other characteristics such as chain length and chemical structure (2018 TR).

Most PDSOs are produced from the extraction, distillation, and further refinement of petroleum. The 2018 TR describes in detail the potential processes by which crude petroleum may be transformed to a narrow range horticultural oil. In general, the crude petroleum may be converted chemically by either catalytic or thermal methods. Once the oils are converted to a certain fraction, additional chemical treatments are applied to the distillates to remove phytotoxic compounds, such as sulfur, while keeping compounds toxic to pests and diseases. Additionally, the 2018 TR states horticultural oils are often formulated with wetting agents or surfactants that allow them to be mixed and diluted with water. Most spray oils in the United States contain a non-ionic surfactant dissolved in the oil concentrate at a concentration of 0.35 percent for citrus use and 0.5 percent for deciduous use.

The exploration and extraction of petroleum has a number of environmental effects that include land use issues, spills, emissions, pipeline and infrastructure construction, among others. However, once the oil is refined and applied as a pest control material, the environmental impact of these oils decreases. The EPA exempts petroleum oils, or mineral oil, from the requirement of a tolerance when applied to growing crops [40 CFR 180.905]. The 2018 TR cites a number of studies that show that actual persistence in the field is highly variable and depends on many factors including temperature, precipitation, sunlight, how the oil is applied, and droplet size. Soil biota degrade these oils over time with the amount of time necessary for degradation dependent on many environmental factors. Various grasses and legumes may also be an effective means of removing petroleum hydrocarbons from the soil.

The effect of spray oils on non-target beneficial organisms varies based on the mobility of the organism, its stage of development, and its ability to reinvade after the oil application (2018 TR). The timing of the oil application may also alter the effects on beneficial organisms. For example, dormant applications of oil may be applied before beneficial organisms become active. Even where oil is applied repeatedly and in the non-dormant season, excellent biocontrol may still be achieved in organic systems. In general, non-dormant application rates are lower than dormant rates in order to prevent plant phytotoxicity. These lower rates may also limit the negative effects on biocontrol agents.   Various studies have confirmed that the use of oils is compatible with integrated pest management systems (2018 TR).

Horticultural oils form the basis for many organic pest control systems. They may prevent the need for higher toxicity insecticides and keep pest populations below economic thresholds. They are widely used in organic tree fruits, traditionally in the dormant season, and more recently, throughout the growing season. They may be used alone or in combination with other materials - the use of oil in these combinations may help increase the activity of the other material through the "spreading" action of the oil in addition to the pest control effect of the oil itself.

Materials such as kaolin, botanical insecticides and plant-based oils may also be alternative to oils. Kaolin may be effective in certain cases but does not have the spectrum of activity that oils do. Botanical insecticides may disrupt biocontrol programs. Other plant-based oils may be alternatives to petroleum-based oils, however, they are not widely used and may not be widely available. The 2018 TR notes a number of alternatives and cites one study that showed that castor, cottonseed, and linseed oils had comparable or better activity than petroleum oils against scales, but the vegetable oils were also more phytotoxic to the plants. Some studies show that plant-based oils may be superior to PDSO's in pest controls, while others indicate lower efficacy.

Biopesticides may also have efficacy against target pests. These include a number of different fungi, bacteria and viruses such as codling moth granulosis virus, *Chromobacterium subtsuga,* and *Bacillus thuringiensis* (*Bt).* Oils may target a variety of pests while these various biopesticides either target a single pest species or a limited range of pest species. Additionally, these biocontrol agents may be applied at different timings than oils and may work better when used in conjunction with oils rather than as alternatives (2018 TR).

Previous sunset reviews included discussions around whether vegetable oils could serve as a natural replacement for the horticultural oils. During those discussions it was discovered that vegetable oils contained synthetic emulsifiers (mainly derived from a petroleum base), that if excluded, would prevent the oils from working properly. Both vegetable and horticultural oils require the addition of emulsifiers to allow them to stay in suspension when added to water for application to the targeted crop. It was also determined that the vegetable oils would not control certain pests adequately compared to the horticultural spray oils.

In past sunset reviews there has been overwhelming support for the continued listing of this material. Organic stakeholders provided a clear message to the full NOSB that this material remains a necessary tool in organic crop production and in fact has increased in use due to the recent growth of organic production. It was also pointed out during public comment that these oils are allowed for use world-wide by most organic certifying bodies for use in organic crop production.

Public comments during the Spring 2019 NOSB meeting echoed earlier comments. Many commenters noted the extensive benefits and need for these oils. One commenter noted that there is no known alternative for control of bugs in soybean fields. Another noted that while other types of oils are available, they will not work in place of horticultural spray oils. They continued by saying that other oils, such as fish or vegetable oils, can be phytotoxic to the foliage or fruit/crop itself and can have compatibility issues with other materials used in organic production. One comment was received asking for an annotation that would protect workers from inhalation hazards and nontarget arthropods from harm and if that annotation is not possible that the oils should be delisted. Other than that comment, there was broad support for the relisting of horticultural oils.

Subcommittee Vote:
Motion to remove horticultural oils from §205.601(e) of the National List based on the following criteria in the Organic Foods Production Act (OFPA) and/or 7 CFR 205.600(b): NA
Motion by: Steve Ela
Seconded by: Dave Mortenson
Yes: 0 No: 8 Abstain: Absent: 0 Recuse: 0

Oils, horticultural—§205.601(i)

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

Reference: 205.601(i) As plant disease control. **(7) Oils, horticultural—narrow range oils as dormant, suffocating, and summer oils.**
Technical Report: 1995 TAP; 2019 TR
Petition(s): N/A
Past NOSB Actions: 04/1995 NOSB minutes and vote; 11/2005 sunset recommendation – deferred; 06/2006 sunset recommendation; 10/2010 sunset recommendation; 10/2015 sunset recommendation
Recent Regulatory Background: Sunset renewal notice published 06/06/12 (77 FR 33290); Renewed 03/15/2017 (82 FR 14420)
Sunset Date: 3/15/2022

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Horticultural oils may be called by many different names; however, the 2018 TR generally refers to them as petroleum-derived spray oils (PDSO's) or mineral oils. Their use has increased and has been refined over the last century. Recognition that different fractions of oils have higher efficacy for pest control and that the range of phytotoxic effects on the plant goes from none to high depending on the fraction used led to the selection of a narrow range of oils exhibiting the dual characteristics of being effective against pests and non-toxic to plants. They are often classified by boiling point, although modern terminology may refer to many other characteristics such as chain length and chemical structure (2018 TR).

Most PDSOs are produced from the extraction, distillation, and further refinement of petroleum. The 2018 TR describes in detail the potential processes by which crude petroleum may be transformed to a narrow range horticultural oil. In general, the crude petroleum may be converted chemically by either catalytic or thermal methods. Once the oils are converted to a certain fraction, additional chemical treatments are applied to the distillates to remove phytotoxic compounds, such as sulfur, while keeping compounds toxic to pests and diseases. Additionally, the 2018 TR states horticultural oils are often formulated with wetting agents or surfactants that allow them to be mixed and diluted with water. Most spray oils in the United States contain a non-ionic surfactant dissolved in the oil concentrate at a concentration of 0.35 percent for citrus use and 0.5 percent for deciduous use.

The exploration and extraction of petroleum has a number of environmental effects that include land use issues, spills, emissions, pipeline and infrastructure construction, among others. However, once the oil is refined and applied as a pest control material, the environmental impact of these oils decreases. The EPA exempts petroleum oils, or mineral oil, from the requirement of a tolerance when applied to growing crops [40 CFR 180.905]. The 2018 TR cites a number of studies that show that actual persistence in the field is highly variable and depends on many factors including temperature, precipitation, sunlight, how the oil is applied, and droplet size. Soil biota degrade these oils over time with the amount of time necessary for degradation dependent on many environmental factors. Various grasses and legumes may also be an effective means of removing petroleum hydrocarbons from the soil.

The effect of spray oils on non-target beneficial organisms varies based on the mobility of the organism, its stage of development, and its ability to reinvade after the oil application (2018 TR). The timing of the oil application may also alter the effects on beneficial organisms. For example, dormant applications of oil may be applied before beneficial organisms become active. Even where oil is applied repeatedly and in the non-dormant season, excellent biocontrol may still be achieved in organic systems. In general, non-dormant application rates are lower than dormant rates in order to prevent plant phytotoxicity. These lower rates may also limit the negative effects on biocontrol agents. Various studies have confirmed that the use of oils is compatible with integrated pest management systems (2018 TR).

Horticultural oils form the basis for many organic pest control systems. They may prevent the need for higher toxicity insecticides and keep pest populations below economic thresholds. They are widely used in organic tree fruits, traditionally in the dormant season, and more recently, throughout the growing season. They may be used alone or in combination with other materials - the use of oil in these combinations may help increase the activity of the other material through the “spreading” action of the oil in addition to the pest control effect of the oil itself.

Materials such as kaolin, botanical insecticides and plant-based oils may also be alternative to oils. Kaolin may be effective in certain cases but does not have the spectrum of activity that oils do. Botanical insecticides may disrupt biocontrol programs. Other plant-based oils may be alternatives to petroleum-based oils, however, they are not widely used and may not be widely available. The 2018 TR notes a number of alternatives and cites one study that showed that castor, cottonseed, and linseed oils had comparable or better activity than petroleum oils against scales, but the vegetable oils were also more phytotoxic to the plants. Some studies show that plant-based oils may be superior to PDSO’s in pest controls, while others indicate lower efficacy.

Biopesticides may also have efficacy against target pests. These include a number of different fungi, bacteria and viruses such as codling moth granulosis virus, *Chromobacterium subtsuga,* and *Bacillus thuringiensis* (*Bt).* Oils may target a variety of pests while these various biopesticides either target a single pest species or a limited range of pest species. Additionally, these biocontrol agents may be applied at different timings than oils and may work better when used in conjunction with oils rather than as alternatives (2018 TR).

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In past sunset reviews there has been overwhelming support for the continued listing of this material. Organic stakeholders provided a clear message to the full NOSB that this material remains a necessary tool in organic crop production and in fact has increased in use due to the recent growth of organic production. It was also pointed out during public comment that these oils are allowed for use world-wide by most organic certifying bodies for use in organic crop production.

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Subcommittee Vote:
Motion to remove horticultural oils from §205.601(i) of the National List based on the following criteria in the Organic Foods Production Act (OFPA) and/or 7 CFR 205.600(b): NA
Motion by: Steve Ela
Seconded by: Harriet Behar
Yes: 0 No: 8 Abstain: 0 Absent: 0 Recuse: 0

Pheromones

§205.601 Synthetic substances allowed for use in organic crop production.
Reference: 205.601(f) As insect management. **Pheromones.**
Technical Report: 1995 TAP; 2012 TR
Petition(s): N/A
Past NOSB Actions: 04/1995 NOSB minutes and vote; 11/2005 sunset recommendation; 10/2010 sunset recommendation; 10/2015 sunset recommendation
Recent Regulatory Background: Sunset renewal notice published 06/06/12 (77 FR 33290); Renewed 03/15/2017 (82 FR 14420)
Sunset Date: 3/15/2022

Subcommittee Review:
Pheromones are volatile chemicals produced in nature by a given species to communicate with other individuals of the same species to affect their behavior. Pheromones are produced naturally by many organisms and are synthetically produced for use in agriculture. Insect pheromones are generally comprised of very specific esters, that alone, or in combination, create a species-specific communication system. Pheromones may be released from various types of dispensers into the surrounding air. Inert ingredients may be used as part of the formulation process but generally do not contact crops since they are contained within the dispensers. Pheromones are considered generally non-toxic and have a low persistence in the environment.

Pheromones are used by organic (and many conventional) crop producers and are especially important for organic tree fruit production. Pheromones are used by growers in a variety of ways such as monitoring insect presence and population density, mass trapping, 'attract and kill' systems, and for use in mating disruption or confusion.

The use of pheromones to attract insects to traps has long been used as a means of monitoring populations, determining whether controls need to be applied, and infer the timing of controls applications. Varying types of dispensers are impregnated with the pheromone and then placed in some sort of monitoring trap. Trapping can field check insect development models as well as be used to determine when a threshold has been reached that might require further action by a farmer. Mass trapping using pheromones as an attractant can also be used to help in reducing the overall numbers of an insect pest. A variant of mass trapping is the attract and kill system. Rather than trapping the insect, these systems use the synthetic pheromone as an attractant to get the insect to come into contact with an insecticide.

Mating disruption/confusion uses a synthetic pheromone to saturate a targeted area. The male of the targeted species is unable to differentiate between the pheromone released by the female and that applied by dispensers. This can cause the male to become confused and disoriented and thus unable to locate the species female for mating. Normally in organic crop production these pheromones are dispersed for use via a passive or active pheromone dispenser (including traps and lures). Some forms of passive dispensers are pheromone-impregnated polymer spirals, ropes, coils, twist ties, or tubes. The use of wires, clips, or circular tubes allows these pheromone dispensers to be placed directly in the intended area of usage. Active dispensers, commonly called puffers, distribute a larger amount of pheromone on a programmed schedule. They are usually used at lower densities than passive dispensers and can be programmed to only release pheromone when the target insect might be active.

As the 2012 technical report notes, while pheromones are produced naturally by insects and other organisms, they are difficult to isolate in sufficient quantities for commercial production. Thus, most commercially used pheromones are synthetically produced and attempt to replicate the natural pheromone. The synthesis of the pheromones is complex and normally involves a number of conversion steps.

The TR further cites various studies showing that insect pheromones are generally comprised of very specific esters. These esters vary in carbon chain length. The primary components of sex pheromones (esters) are the most critical part of the chemical complex, but are reliant on the presence or absence of secondary components, which greatly affect an insect’s response sequence.

During past reviews there has been concern raised over the inerts used in pheromones because they do include known irritants, sensitizers, and allergens. The 2012 TR mentions that some compounds could potentially be linked to asthma, cancer, or endocrine disruption. However, under the current use of pheromones it is not believed that they would release enough volume to leave any kind of residue on the agricultural crops being treated. It also states that dissipation takes place via volatilization and degradation, rapidly into the environment.

In past reviews, some concerns were raised around the use of “encapsulated pheromones” (those concerns mentioned harm to honey bees and concerns over aerial applications). These involve small pheromone containing capsules that might be applied in water or by air and could have direct crop contact. However, use of these forms of pheromones has not generally reached commercial application.

The 2012 TR notes that based on low observed toxicity in animal testing, and expected low exposure to humans, there is no risk to human health expected from the use of pheromones. EPA data shows that no human health concerns had been reported in the ten years prior to the TR.

Pheromones continue to be an integral and highly used component of organic agriculture. Their use in trapping and monitoring provides a basis for integrated pest management and helps to ensure that other pest control materials are only applied where and when needed. For certain pests in organic systems their use in mating disruption may be the only viable control option and in other systems their use precludes the need for more disruptive control options.

Public comments from previous sunset reviews have been strongly supportive of the relisting of pheromones. Other commenters have noted that their delisting would lead to the loss of many acres of organic tree fruits. Comments noted that the use of pheromones in organic crop production has continued to increase, as various formulations have been developed for specific target species.

Public comments received during the Spring 2019 NOSB meeting were in favor of relisting pheromones. There were many comments noting their widespread use, insect specificity, use in monitoring populations, and benign nature. Several commenters did support relisting with the caveat that the pheromones are identical to or substantially similar to natural pheromones, in passive dispensers, without added toxicants and with only approved inert ingredients. There is currently no annotation for pheromones, but comments received indicate that their use generally fits this request. Microencapsulated pheromones which might be sprayed and have direct fruit contact have not become commercially available. Active dispensers (also known as puffers) are in current use, but act in similar fashion to the passive dispensers in terms of fruit contact or type of pheromone used.

Subcommittee Vote:
Motion to remove pheromones from §205.601(f) of the National List based on the following criteria in the Organic Foods Production Act (OFPA) and/or 7 CFR 205.600(b): NA
Motion by: Steve Ela
Seconded by: Dave Mortenson
Yes: 0 No: 8 Abstain: 0 Absent: 0 Recuse: 0

Ferric phosphate

§205.601 Synthetic substances allowed for use in organic crop production.
Reference: §205.601(h) As slug or snail bait. **Ferric phosphate (CAS #s 10045-86-0).**
Technical Report: 2004 TAP, 2010 TR, Supplemental TR 2012
Petition(s): 05/2003 , Supplemental Information 02/2005, Petition to remove: 07/2009
Past NOSB Actions: 03/2005 sunset recommendation; 04/2010 sunset recommendation; 10/2012 recommendation on petition to remove from national list; XX/2016 sunset recommendation
Recent Regulatory Background: Added to National List 09/11/06 71 FR 53299; Renewed 08/03/2011 76 FR 46595; Renewed 09/12/16 81 FR 8821
Sunset Date: 9/12/2021

Subcommittee Review:

Use
Ferric phosphate is used as a molluscicide for slug and snail suppression. Ferric phosphate accumulates in the calcium spherules of slug and snail digestive glands, thereby interfering with calcium metabolism, and in turn, disrupting feeding and mucus production. After ingesting ferric phosphate slugs and snails stop feeding and death due to starvation will occur three to six days later. Ferric phosphate occurs naturally in soil but at considerably lower concentrations than that present in the formulated, baited product.

Manufacture
Ferric phosphate occurs naturally in the soil; however, to achieve concentrations toxic to molluscs ferric phosphate must be supplemented through applications, most often with ferric phosphate formulated with a chelating agent. To produce ferric phosphate synthetically, an aqueous iron sulfate solution is mixed with an aqueous disodium phosphate solution in a stainless steel boiler. The mixture is heated to 50-70 °C in order to precipitate ferric phosphate. The precipitate is filtered from the solution, washed with distilled

water, and dried with hot air. The baited pellets contain approximately 1% by mass of ferric phosphate with the remainder of the pellet comprised of a chelating agent and carbohydrate inerts. The EPA describes ferric phosphate as ubiquitous in nature. It is a solid. It is not volatile and does not readily dissolve in water, which minimizes its dispersal beyond where it is applied.

International acceptance by other international certifying bodies
The European Union, the Canadian General Standards Board, The International Federation of Organic Agriculture Movement and the Japanese Organic Standard for Organic Plants all list ferric phosphate for use as a molluscicide in the protection of plants.

Environmental/Health Issues
The EPA describes ferric phosphate as ubiquitous in nature. It is a solid. It is not volatile and does not readily dissolve in water, which minimizes its dispersal beyond where it is applied. Small concentrations of ferric phosphate are made available in soil solution when it is solubilized by commonly occurring soil microorganisms such as *Penicillium radicum*.

Ferric phosphate by itself appears to be less toxic to a range of soil borne organisms (including slugs and snails) than when formulated with a chelating agent (EDTA or EDDS for example). The chelating agent enhances iron uptake by organisms in general. A number of published studies document that when formulated with a chelating agent, the efficacy for control of slugs and snails increases significantly. However, the increased efficacy also means its activity on non-target organisms like earthworms, domestic animals and humans also increases. The LD50 for ferric phosphate alone is greater than 10,000 mg kg while it drops to 80 mg kg when it is formulated with the chelating agents EDTA or EDDS (Ethylene diamine tetracetic acid – EDTA and Ethylene diamine disuccinic acid (EDDS).

Discussion
The 2012 technical review addressed a series of concerns about the biological activity of ferric phosphate both in terms of its effectiveness in suppressing slugs and snails as well as its non-target effects on the ecology and abundance of soil dwelling organisms. Because the commercial formulations of ferric phosphate always included ferric phosphate itself and a chelating agent the NOSB was concerned about the effects of the formulated products used by farmers. Specifically, four questions regarding the efficacy of ferric phosphate alone and the synergizing effects of chelating agents (EDTA and EDDS) concluding without the chelating agent, ferric phosphate did not provide sufficient or consistent suppression of slugs and snails. In fact the efficacy was so low that it is hard to see why it would be used for slug and snail suppression without the chelating agent. The TR then asked, what risk does the use of ferric phosphate and its associated chelating agents pose to soil organisms and water quality. Here the existing data are scant. What has been researched (three studies published between 2006 and 2009) indicate a range of responses from non-significant to highly significant adverse effects of chelated ferric phosphate on a range of non-target organisms. A second technical review was sought and received to underpin this 2018 Sunset review. In that technical review, the Crops Subcommittee asked if additional research had been conducted addressing the following questions: 1) What new findings have been reported since 2009 that would inform our understanding of the influence of ferric phosphate alone and ferric phosphate in combination with commonly used chelating agents on the soil micro and macro fauna with particular attention to earthworm populations?; 2) To what extent is ferric phosphate used for slug and snail management in organic production?; 3) How are the products formulated that are detailed in (2) above?; 4) Since the July 26, 2012 technical review, have additional studies been conducted documenting the effects of fieldworker exposure to ferric phosphate bait handling including inhalation of dust resulting from field applications. The same questions were posed to the public with a particular focus on the second question, how widely is ferric phosphate used?

From the 2018 technical review we learned that little additional research has been conducted since the 2012 technical review quantifying the soil community response to ferric phosphate. The technical review did confirm that commercial formulations routinely include ferric phosphate and a chelating agent. We received considerable public comment on ferric phosphate learning that it is seen as an integral part of vegetable and fruit pest management and is widely used for slug and snail management in organic systems. We heard from some public comments that while a systems-approach is taken to address the slug and snail problem, attempts by organic farmers to increase reliance on cover-cropping and decreased tillage can lead to increased slug and snail abundance. The Subcommittee recognizes the efficacy of ferric phosphate is inextricably linked with the formulation; when formulated with a chelating agent, ferric phosphate effectively suppresses slugs and snails, unfortunately, the non-target effects on other soil organisms increase as well.

Vote in Subcommittee:
Motion to remove ferric phosphate from the National List at §205.605 based on the following criteria in the Organic Foods Production Act (OFPA) and/or 7 CFR 205.600(b): NA
Motion by: Dave Mortensen
Seconded by: Harriet Behar
Yes: 0 No: 5 Abstain: 3 Absent: 0 Recuse: 0

Potassium bicarbonate

§205.601 Synthetic substances allowed for use in organic crop production.
Reference: 205.601(i) As plant disease control. **(9) Potassium bicarbonate.**
Technical Report: 1999 TAP; 2015 TR
Petition(s): N/A
Past NOSB Actions: 10/1999 NOSB meeting minutes and vote; 11/2005 sunset recommendation; 10/2010 sunset recommendation; 10/2015 sunset recommendation
Recent Regulatory Background: Sunset renewal notice published 06/06/12 (77 FR 33290); Renewed 03/15/2017 (82 FR 14420)
Sunset Date: 3/15/2022

Subcommittee Review:
Potassium bicarbonate is a plant disease control material. It is used by organic crop producers to control *alternaria* in cucurbits and cole crops; anthracnose in cucurbits, blueberries, grapes, spinach, and strawberries; black dot root rot and early blight in potatoes; sooty blotch and powdery mildew in apples; downy mildew in cucurbits, cole crops, grapes, and lettuce; gray mold (*Botrytis cinerea*) in beans, lettuce, and strawberries. These are just a few of the crops and specific diseases it helps to control. It is best suited for many of the powdery mildew diseases (TR lines 80-1) and early blight (1999 TAP). It has proven to be an important disease control aid in organic crop production.

Potassium bicarbonate is produced by carbonating potassium hydroxide to K_2CO_3, which is then carbonated to $KHCO_3$. Carbonation is accomplished by injecting carbon dioxide gas into an aqueous solution of potassium hydroxide. (1999 TAP)

The 1999 TAP review states that the decomposition products are potassium carbonate, water, and carbon dioxide, all of which readily dissipate in the environment. It found this material to be compatible with organic crop production, safe, and more environmentally friendly than many of the synthetic alternatives. Potassium bicarbonate is a mild respiratory and eye irritant.

During the 2015 sunset review, a limited scope Technical Report (TR) was requested. The TR provided possible alternative materials or practices that might replace this material. *Bacillus amyliquifaciens* strain D747, *Bacillus subtilis, Bacillus pumilis,* gibberellic acid, and *Streptomyces griseovirdis and lydicus, Gliocladium catenulatum,* and extracts of giant knotweed are all listed as natural alternatives for numerous plant diseases across many crops. Bordeaux mixture, kaolin, lime sulfur and sulfur, hydrogen dioxide, and neem extracts are offered as alternatives for both treatment and disease prevention across myriad crops and diseases, in addition to a variety of cultural and mechanical practices. Further clarification was sought in 2015 from stakeholders using this material to help explain under what conditions or scenarios the alternatives might be applied. Organic producers responded that while alternative materials and/or practices exist, potassium bicarbonate remains necessary for their particular crop production practices. Potassium bicarbonate is an important tool in powdery mildew resistance management. In addition to its efficacy on powdery mildew, stakeholders said its unique mode of action helps control other diseases under certain conditions or scenarios better than the alternative materials or practices.

There was continued support for the continued listing of this material in 2015. One commenter was concerned that this material does not fit into any of the categories under §6517(c)(1)(B)(i) of OFPA. Others noted its extensive listing in Organic Systems Plans. Based on extensive public comment, the NOSB continued to find potassium bicarbonate compliant with OFPA criteria and did not recommend removal from the National List.

As part of the Spring 2019 public meeting, the Crops Subcommittee asked about efficacy of alternatives and the continued need for potassium bicarbonate. Written and oral testimony expressed continued support for this material, stating that it is used to control a number of diseases across a wide range of crops, including strawberries, cucurbits, tomatoes, and fruit trees. It is used in field, high tunnel, and greenhouse applications, and it is employed by some as part of a material rotation. One commenter expressed that it does not fit any OFPA categories of allowable synthetics.

Subcommittee vote
Motion to remove potassium bicarbonate from §205.601 (i) based on the following criteria in the Organic Foods Production Act (OFPA) and/or 7 CFR 205.600(b) if applicable: NA
Motion by: Emily Oakley
Seconded by: Dave Mortenson
Yes: 0 No: 7 Abstain: 0 Absent: 1 Recuse: 0

Magnesium Sulfate

§205.601 Synthetic substances allowed for use in organic crop production.
Reference: 205.601(j) As a plant or soil amendment. **(6) Magnesium sulfate—allowed with a documented soil deficiency.**
Technical Report: 1995 TAP; 2011 TR
Petition(s): N/A
Past NOSB Actions: 04/1995 NOSB minutes and vote; 11/2005 sunset recommendation; 04/2010 sunset recommendation; 10/2015 sunset recommendation

Recent Regulatory Background: Sunset renewal notice published 06/06/12 (77 FR 33290); Renewed 03/15/2017 (82 FR 14420)
Sunset Date: 3/15/2022

Subcommittee Review:
Magnesium sulfate is used to correct for magnesium soil deficiencies and helps to improve the uptake of nitrogen and phosphorus by crops, helps seeds germinate, increases chlorophyll production, aids in the production of flowering, and is vital in maintaining crop growth and yield.

Magnesium sulfate can be obtained from naturally occurring sources (kieserite or epsomite open-pit mines) or can be manufactured by a chemical process. Mineral forms of magnesium sulfate are dehydrated, purified, and reacted with sulfuric acid to create the synthetic version of magnesium sulfate. Historically, there have been no commercially available products containing mined, raw mineral magnesium sulfate in bulk quantities suitable for agriculture. For this reason, the production of synthetic magnesium sulfate has been necessary.

As stated in the 2011 Technical Report (TR) (lines 320-23): “If applied as a foliar feed in recommended doses (assuming also that a magnesium deficiency has been documented), magnesium sulfate would not be expected to produce toxic effects. However, if too much magnesium sulfate is added to the soil, or if the substance is added when a magnesium deficiency has not been determined, the uptake of other important nutrients will be affected.” The TR goes on to state that when used properly, it is unlikely to cause environmental or human health harm.

During the 2015 review, the Crops Subcommittee asked stakeholders if non-synthetic magnesium sulfate is available in the marketplace. Public comment indicated that the only form of non-synthetic magnesium sulfate that has been reviewed is potassium magnesium sulfate, or langbeinite; however, this material is not a reliable alternative because it is only available in limited quantities, and it is impossible to determine upon purchase whether langbeinite is synthetic or non-synthetic. There was substantial public comment in support of relisting magnesium sulfate. It is actively used by stakeholders and continues to be considered necessary to the production of fruit and vegetables. One commenter opposed the relisting, stating that nonsynthetic magnesium sulfate is available as langbeinite and dolomite; however, langbeinite is constrained by supply and classification issues. While dolomite can be used to treat a magnesium deficiency, the TR states that it is not as effective as magnesium sulfate and was not referenced by other commenters as a viable alternative. No significant new issues were raised, and the NOSB continued to find magnesium sulfate compliant with OFPA criteria and did not recommend removal from the National List.

As part of the Spring 2019 public meeting, the Crops Subcommittee asked if non-synthetic magnesium sulfate is available and about growers’ experiences using non-synthetic dolomite. Written and oral testimony expressed continued support for this material, stating that it is important in high tunnels and greenhouses as well as fruit tree production. Some growers commented that dolomite is not a suitable substitute in all cases as it cannot be used in high pH soils nor as a foliar application. It was also noted that there are few non-synthetic products on the market. Magnesium sulfate is also used in high pH soils when sulfur is needed but growers do not want to increase the pH. It is used alone and in blended products. Another commenter noted that use of magnesium sulfate should not take the place of soil building practices.

Subcommittee Vote:
Motion to remove magnesium sulfate from §205.601 (j) based on the following criteria in the Organic Foods Production Act (OFPA) and/or 7 CFR 205.600(b) if applicable: NA
Motion by: Emily Oakley
Seconded by: Asa Bradman
Yes: 0 No: 7 Abstain: 0 Absent: 1 Recuse: 0

Hydrogen chloride

§205.601 Synthetic substances allowed for use in organic crop production.
Reference: §205.601(n) Seed preparations. **Hydrogen chloride (CAS # 7647-01-0)—for delinting cotton seed for planting.**
Technical Report: 2003 TAP, 2014 Limited Scope TR
Petition(s): Hydrogen Chloride 10/30/02
Past NOSB Actions: 05/2004 NOSB recommendation for National List; 11/2009 sunset recommendation; 4/2015 recommendation
Recent Regulatory Background:
Added to National List 09/11/06 (71 FR 53299); Renewed 08/03/2011 (76 FR 46595)
Renewed 09/12/16 (81 FR 8821)
Sunset Date: 9/12/2021

Subcommittee Review:

Use
Hydrogen chloride (2HCl) (CAS# 7647-01-0) forms a strong acid used for delinting cotton seed for planting. Hydrogen chloride is a liquid anhydrous hydrogen gas that is vaporized and then sprayed on cotton seeds after the ginning process. The gas mixes with the moisture in the seeds, resulting in acidic properties under which the lint on the seeds becomes weakened and is buffed off before planting. Because many fibers are attached to the seeds even after ginning, delinting improves handling (i.e., flowability) for subsequent planting by mechanized equipment.

Manufacture
There are several methods used to produce hydrogen chloride. It can be synthesized directly or as a byproduct from manufacturing other chlorinated or fluorinated compounds.

International acceptance
Canadian General Standards Board Permitted Substances: Not listed.
CODEX Alimentarius: Not Listed
European Economic Community (EEC) and India (NPOP): Hydrogen chloride not listed. Hydrochloric acid is listed for gelatin production and cheese processing (EEC)
Japan Agricultural Standard (JAS) for Organic Production: Not listed
International Federation of Organic Agriculture Movements (IFOAM): Not listed.

Ancillary substances
None

Impacts on health and the environment

Hydrogen chloride gas and subsequently produced hydrochloric acid are strongly corrosive materials and can cause skin burns, severe respiratory damage, circulatory system failure and death. Spills during manufacture or handling can injure workers or locally damage the environment.

Discussion

Hydrogen chloride for delinting cottonseed was recommended by the NOSB to be added to the National List in April 2004, and has been recommended each time it has subsequently been reviewed. However, hydrogen chloride, and the subsequently formed hydrochloric acid, are very corrosive materials and pose potential environmental and health threats if not handled properly. The 2014 limited scope TR identified several alternative, nonsynthetic delinting processes under development that were not commercially available at that time. The decision to relist was based on the lack of viable alternatives and the hope "that mechanical or other delinting processes are available to organic cotton growers by the next sunset review, so this very corrosive acid can be removed from the National List." The 2014 limited TR included information (see Table 1 below) describing several alternatives to hydrogen chloride, and also referenced a mechanical cottonseed delinter under review by the USDA Agricultural Research Service. In follow-up to public comments from the Spring 2019 meeting, the Crops Subcommittee reached out to the Texas Organic Cotton Marketing Cooperative and Dr. Jane Dever, a professor and cotton breeder at Texas A&M for additional clarification on mechanical seed cleaning methods, obstacles to adopting non-chemical methods, and challenges addressing seed dormancy.

Table 1 Methods for preparing cottonseed for planting

Method	Applications	Approved for USDA Organic?
No treatment	Seed is planted manually. Not suitable for large farms	Yes
Concentrated Sulfuric Acid Delinting	Used commercially to permit metered planting	No
Dilute Sulfuric Acid Delinting	Used commercially to permit metered planting	No
Acid-Gas Delinting using Hydrogen Chloride	Used commercially to permit metered planting	Yes, allowed synthetic substance.
Power Roller Gin Relinting	Used in conjunction with coating	Yes
New Sawless Mechanical Delinter	No chemical treatment or coating is necessary. Not currently commercialized.	Yes
Baobab Tree Extract Delinting	Small scale, localized use.	Yes, nonsynthetic
Mud and Dung Coating	Small scale, localized use.	Yes, nonsynthetic
Starch Based Coating	In development for large scale use.	Only if starch is nonsynthetic. Dextrin was previously petitioned as a synthetic seed coating and was not recommended by NOSB.
Clay Based Coating	In development for large scale use.	Yes, if nonsynthetic
Chitosan	In use for rice, other seeds to follow	No.

Overall, comments and discussion reviewed for the Spring 2019 NOSB meeting and subsequent information confirms that circumstances since 2014 are unchanged. Although progress has been made, viable alternatives to hydrogen chloride are not yet available. A key challenge is the small size of the U.S organic production market which does not economically incentivize companies to develop organic-specific technologies. Spring 2019 public comments were universally supportive of relisting hydrogen chloride as essential, and asserted that failure to do so would irreparably harm the U.S. organic cotton industry. Allowing the limited use of hydrogen chloride for seed preparation accrues economic and environmental benefits by supporting domestic organic cotton production and avoiding associated impacts of heavy pesticide use on conventional cotton. The need for additional specialized research to support alternatives to hydrogen chloride, a caustic and potentially harmful material, were emphasized, and is supported by the Crops Subcommittee.

Subcommittee Vote:
Motion to remove hydrogen chloride for delinting cotton seed for planting based on the following criteria in the Organic Foods Production Act (OFPA) and/or §205.601(n) seed preparations if applicable: NA
Motion by: Steve Ela
Seconded by: Harriet Behar
Yes: 0 No: 7 Abstain: 0 Absent: 1 Recuse: 0

Ash from manure burning

§205.602 Nonsynthetic substances prohibited for use in organic crop production.
Reference: 205.602(a) **Ash from manure burning.**
Technical Report: none
Petition(s): 2014
Past NOSB Actions: 04/1995 NOSB minutes and vote; 11/2005 sunset recommendation; 10/2010 sunset recommendation, 10/2015 sunset recommendation; 4/2016 NOSB formal recommendation
Recent Regulatory Background: Sunset renewal notice published 06/06/12 (77 FR 33290); Renewed 03/15/2017 (82 FR 14420)
Sunset Date: 3/15/2022

Subcommittee Review:

Use: In some areas of nonorganic agriculture, the burning of manure to create an ash is used to lessen the volume of material (manure) transported to a field for fertilizer and to recover some of the nutrients in a more concentrated form (phosphorus, calcium, potassium and magnesium). The ash can then be used as a fertility input that is high in these nutrients. Large scale biochar manufacturing facilities claim that CAFOs can benefit from this manufacturing process, to lessen the impact of the volume of manure they need to dispose of from their facilities. This ash from manure has also been touted as a feed ingredient for livestock. The NOP organic standards do not allow re-feeding of manure to organic livestock.

Manufacture: Manure can be thermally decomposed through combustion to produce this ash.

International: Canadian standards do not allow ash from manure burning to be used on organic crops. The EU does not allow manure from confined animal operations to be used on organic crops.

Summary of Public Comment:
The vast majority of public comment addressing this material agreed with a continued listing as a prohibited material. However, one commenter discussed the benefits of controlled pyrolysis burning to create a manure-based biochar as being a good way to avoid the negative effects of nutrient leaching and other issues dealing with large volumes of raw manure. This commenter discussed the special property of heavy metal soil remediation in contaminated soils of manure-based biochars, over plant-based biochars. This was the only comment that answered the Subcommittee's question in our first review:

"*Does ash from manure burning supply nutrients or other benefits that cannot be obtained from any other material*?"

Discussion:
In April 2016, the NOSB responded to a petition to allow ash from manure burning with the following annotation: "except where the combustion reaction does not involve the use of synthetic additives and is controlled to separate and preserve nutrients". The petitioner stated they source manure from Concentrated Animal Feeding Operations (CAFOs) and use a staged thermochemical reactor to extract minerals from their poultry manure source. The NOSB stated the following to support their recommendation to keep this material, as listed, as a prohibited nonsynthetic:

"*Ash from manure burning was placed on §205.602 based on its incompatibility with organic production: "Burning these materials is not an appropriate method to recycle organic wastes and would not be considered a proper method in a manuring program because burning removes the carbon from these wastes and thereby destroys the value of the materials for restoring soil organic content. Burning as a disposal method of these materials would therefore not be consistent with section 2114(b)(1) of the OFPA (7 U.S.C. 6513(b)(1))." (Preamble to proposed rule, December 16, 1997. 62 FR 241: 65874)"*

The USDA organic regulations require "soil-building" as a basic foundational principle, to improve soil tilth, water retention, nutrients and carbon sequestration. *"§205.203 (c) The producer must manage plant and animal materials to maintain or improve soil organic matter content*…."

Soil microbiological life increases when provided with carbon-based sources containing a variety of nutrients, and extraction of nutrients while destroying others (such as nitrogen) does not meet either the letter, nor spirit of the USDA organic law or regulations.

The current crop subcommittee agrees with the previous NOSB recommendation, and prefers manure retain its full carbon and nutrient content, when used as a fertility input on organic land.

Subcommittee Vote:
Motion to remove ash from manure burning from §205.602 of the National List based on the following criteria in the Organic Foods Production Act (OFPA) and/or 7 CFR 205.600(b): NA
Motion by: Harriet Behar
Seconded by: Jesse Buie
Yes: 0 No: 8 Abstain: 0 Absent: 0 Recuse: 0

Sodium fluoaluminate (mined)

§205.602 Nonsynthetic substances prohibited for use in organic crop production.
Reference: 205.602(g) **Sodium fluoaluminate (mined).**
Technical Report: none
Petition(s): N/A
Past NOSB Actions: 05/1996 NOSB meeting minutes and vote; 11/2005 sunset recommendation; 10/2010 sunset recommendation; 10/2015 sunset recommendation
Recent Regulatory Background: Sunset renewal notice published 06/06/12 (77 FR 33290); Renewed 03/15/2017 (82 FR 14420)
Sunset Date: 3/15/2022

Subcommittee Review:
Sodium fluoaluminate (Na_3AlF_6)—also known as "sodium fluoroaluminate," "aluminum sodium fluoride," "trisodium hexafluoroaluminate," and "cryolite"—is a colorless to white halide mineral. It occurs in a large deposit at Ivigtut, Greenland, and in small amounts in Spain, Colorado, U.S., and elsewhere. It is used as a solvent for bauxite in the electrolytic production of aluminum and has various other metallurgical applications, and it is used in the glass and enamel industries, in bonded abrasives as a filler, and in the manufacture of insecticides (see www.britannica.com/science/cryolite for information on cryolite). Sodium fluoaluminate is also produced synthetically.

According to an EPA memorandum dated March 16, 2011, on the subject of "Cryolite. Human Health Assessment Scoping Document in Support of Registration Review" (link to document available via https://fluoridealert.org/researchers/pesticide/cryolite/):

> Cryolite [sodium aluminofluoride or sodium aluminum fluoride or sodium hexafluoroaluminate] is an insecticide used to control a variety of pests including various weevils, leaf rollers, various moth and worm species, and grape skeletonizers. Cryolite can be used on a wide array of agricultural crops including grapes (wine, table, raisin), cole crops, citrus, berries, tomatoes, cucumber, lettuce, and many types of ornamentals. Formulations include dusts, wettable powders, water dispersible granules, and baits/solids. Some formulations can contain as much as 96 percent active ingredient by weight. A recent evaluation of cryolite use indicates almost 2 million pounds per year are applied on about 300,000 acres, most of which are on grapes (92% of total pounds applied and 96% of treated acres) (Prieto, 2010). Use in California accounts for the vast majority of cryolite use (97%). In agriculture, groundboom, airblast, and aerial applications are typical but applications as a pure dust can also occur which may dictate other specialized forms of equipment being used. Applications to ornamentals may also be made using handheld equipment such as low and high pressure handgun sprayers and backpack sprayers. There are no cryolite containing products that appear to be marketed for sale to homeowners nor are there products which appear to be labeled for use by professionals in the residential marketplace (i.e., outdoors or indoors). Maximum application rates for most agricultural crops are in the 5 to 16 pounds product per acre range while some uses, especially on ornamentals can be higher (i.e., up to 30 lb/A using a 96% formulation).

The potential toxicity of sodium fluoaluminate/cryolite is due to the release of fluoride into the environment due to the dissociation of cryolite into fluoride. The EPA memorandum cited above references a number of animal toxicological studies on this substance; other studies related generally to fluoride toxicity are also referenced, since fluoride enters the environment in multiple ways—including fluoridated water—and therefore can have a cumulative adverse impact on health.

There were no references to either sodium fluoaluminate or cryolite in the Canadian and European organic regulation websites.

Public Comment from the Spring 2019 NOSB Meeting
There were only a few written comments received regarding sodium fluoaluminate prior to the Spring 2019 NOSB meeting. All supported continued relisting of this substance as prohibited.

Conclusion
Given the toxicity associated with fluoride pollution in the environment and the multiple sources of such pollution, continued prohibition of this substance in organic production seems prudent.

Additional information requested by Subcommittee
Are there any reasons why the long-standing prohibition on using sodium fluoaluminate in organic production should be reconsidered by the NOSB?

Subcommittee Vote:
Motion to remove sodium fluoaluminate (mined) from § 205.602 of the National List based on the following criteria in the Organic Foods Production Act (OFPA) and/or 7 CFR 205.600(b): NA
Motion by: Dan Seitz
Seconded by: Jessie Buie
Yes: 0 No: 8 Abstain: 0 Absent: 0 Recuse: 0