

Mineral Oil

Executive Summary: Mineral oil is currently allowed as a synthetic substance for use in organic livestock production “for topical use and as a lubricant” [7 CFR 205.603(b)(4)]. Section 205.603 deals with synthetic substances “as topical treatment, external parasiticide or local anesthetic as applicable” which are strictly external uses. Pending adjudication, the use of mineral oil as an internal lubricant can be construed as not being permitted by the current regulation.

The first petitioned use is for internal use of mineral oil as an oral drench for treatment for omasal impaction and diarrhea. The second petitioned use of mineral oil is as a feed additive, specifically as a dust suppressant, in livestock feed and livestock feed ingredients, specifically vitamin/mineral blends. Mineral oil is a fraction of petroleum produced by fractional distillation. Mineral oil has already been judged to be synthetic [7 CFR 205.603].

Specific Uses:

Mineral oil is used to suppress dust in mineral premixes and salt blocks.

Manufacturing information :

Mineral oil is a liquid petroleum derivative of processing crude oil. ¹

Historic Use: How has mineral oil been used as a dust suppressant by the organic industry?

Organic farms in the Midwest and West were contacted and interviewed and they are not using mineral oil as a dust suppressant for feed. Instead, the mineral oil is used to suppress dust for mineral mixes that individual farms buy from feed stores. Large organic farms often mix their own minerals and often use vegetable oil or rosemary oil² instead of mineral oil. Mineral oil is known to reduce the absorption of fat-soluble vitamins by humans and other animals.

Status Among US Certifiers: Is mineral oil approved for use as a dust suppressant?

Mineral oil is NOT allowed to be used in feed by organic farmers. This disallowance is in accordance with the laws of synthetic material permission in organic farming. Mineral oil is used for emergency use only. Some examples include using mineral oil for cases of bloating or where a lubricant is needed. Mineral oil is allowed for emergency use because there are so few emergency options available for organic farmers. NFOA VT³ tries to provide farmers with as many emergency remedy options as possible. Mineral oil

¹ Phone interview. Bentag-West Inc. formerly known as Dyce Chemical Inc. December 19, 2002.

² Particularly common in the Northeast

³ National Organic Farming Association of Vermont

Mineral Oil TAP Supplement

CFNP

January 20, 2003

in general is not used extensively in organic farming due to consideration for livestock health care.(John Cleary, 2003)

Mineral Oil regulations:

[Code of Federal Regulations]

Title 21, Volume 1

[CITE: 21CFR573.680]

PART 573--FOOD ADDITIVES PERMITTED IN FEED AND DRINKING WATER OF ANIMALS (Subpart B--Food Additive Listing, Sec. 573.680 Mineral oil).

Mineral oil may be safely used in animal feed, subject to the provisions of this section.

(a) Mineral oil, for the purpose of this section, is that complying with the definition and specifications contained in Sec. 172.878 (a) and

(b) or in Sec. 178.3620(b)(1) (i) and (ii) of this chapter.

(b) It is used in animal feeds for the following purposes:

(1) To reduce dustiness of feeds or mineral supplements.

(2) To serve as a lubricant in the preparation of pellets, cubes, or blocks and to improve resistance to moisture of such pellets, cubes, or blocks.

(3) To prevent the segregation of trace minerals in mineralized salt.

(4) For the removal of water from substances intended as ingredients of animal feed.

(c) The quantity of mineral oil used in animal feed shall not exceed 3.0 percent in mineral supplements, nor shall it exceed 0.06 percent of the total ration when present in feed or feed concentrates. (2002a)

Also, the Committee for Veterinary Medicinal Products in the UK has deemed mineral hydrocarbons safe in all food producing animal species by the inclusion of mineral hydrocarbons, which consist of mineral oils, in the Annex II of Council Regulation (EEC) No 2377/90. These inclusive mineral hydrocarbons include those with high and low viscosities, including microcrystalline waxes. This category does exclude aromatic and unsaturated compounds.(The European Agency for the Evaluation of Medicinal Products Veterinary Medicines Evaluation Unit, 1995)

Current FDA regulations (21CFR573.680, Mineral oil) permit the use of mineral oil in conventional animal feeds to reduce dustiness of feeds or mineral supplements; to serve as a lubricant in the preparation of pellets, cubes, or blocks and to improve resistance to moisture of such pellets, cubes, or blocks; to prevent the segregation of trace minerals in mineralized salt. The regulation requires that the quantity of mineral oil used in animal feed shall not exceed 3% percent in mineral supplements.

Section 2119 OFPA:

Question 2. The toxicity and mode of action of the substance and its breakdown products or any contaminants, and their persistence and areas of concentration in the environment.

Mineral Oil TAP Supplement

CFNP

January 20, 2003

Environmental Impact

Mineral oil was studied in the south of France as to how it would degrade and possibly contaminate ground soils and water supplies. Complete degradation of the mineral oil took 90 days total. Chromatography and liquid chromatography techniques were used to examine the migration of oil into soil. The soil had a consistent pH range of 6-7, conditions optimal for plant growth. The mineral oil migrated through 20cm of the soil down from the top of the surface. No traces of mineral oil were found in water supplies percolating in the soil. This finding implies that mineral oil does not migrate deep enough into soil upon saturation to harm soil organisms or infect subterranean waters. Mineral oil metabolites were not monitored. Therefore, no accurate data is present on how the chemical breakdown process of the oil in the soil. Based on GUS coefficient calculations for the mineral oil, it is proved to be very immobile. The oil was degraded by micro-organisms found in the soil. ⁴

Question 3: The probability of environmental contamination during manufacture, use, misuse, or disposal of the substance.

A study was conducted on the possible cancer risks associated with workers who continually were exposed to mineral oil mists. The study followed reports of automotive workers who were diagnosed with gastrointestinal cancer. Death ratios for those exposed to mineral oil mists were calculated based on the actual number of reported deaths to the expected amount. Among those who experienced heavy mineral oil mist exposure, the rates of testicular and lung cancer increased, as well as Hodgkin's disease. Lung cancer risks were greatest for workers with fifteen or more years of experience in related work fields. Stomach cancer increases were seen in workers exposed to mineral oil mists for at least five years. Significant deaths were also attributed to asthma and emphysema patients. The American Journal of Industrial Medicine has published several studies and correlations between severe health hazards and mineral oil mists. This can imply that feed workers handling mineral oil may be susceptible to major health complications, the longer they are around mineral oil mists. "Further studies with information on the presence of contaminants and additives in oil mists will help elucidate the relationship between oil mist exposure and cancer. Am. J. Ind. Med. 38:410-416, 2000. Published 2000 Wiley-Liss, Inc." ⁵

Question 4. The effect of the substance in human health and other animals, including livestock.

The health effects of dust particles depend very much on the nature of the dust. Particles with aerodynamic diameters smaller than 5 µm can penetrate deep into the lung. The

⁴ "Fate in the soil of an oil additive of plant origin." *Pest Management Science*. 58:1236-1242. 2002. <http://www3.interscience.wiley.com/cgi-bin/fulltext?ID=99017210&PLACEBO=IE.pdf>

⁵ "Mortality among workers exposed to cutting oil mists." Division of Cancer Epidemiology and Genetics, National Cancer Institute, Rockville, Maryland. Am. J. Ind. Med. 38:410-416, 2000. Published 2000 Wiley-Liss, Inc.

Mineral Oil TAP Supplement

CFNP

January 20, 2003

larger particles are deposited in the upper airways. High dust concentrations can irritate the mucous membranes and overload the lung clearance mechanisms. In humans and other animals, orally administered mineral oil can cause pneumonia due to inhalation.

Mineral oil can cause a variety of untoward effects on human health:

1. Decreased absorption of vitamins A, D, E and K because it acts as a lipid solvent. After oral ingestion, mineral oil may interfere with absorption of essential fat-soluble substances.(Goodman & Gillman, 1980)
2. Mineral oil can elicit a typical foreign-body reaction in intestinal mucosa, mesenteric lymph nodes, liver, and spleen. Mineral oils used as lubricants for metal workers have been associated with increased occupational risk of skin cancer.(Goodman & Gillman, 1980)
3. If mineral oil gains access to the lungs, it can produce lipid pneumonitis. This has been frequently observed when it is used as a vehicle for application of drugs to nasal mucous membranes and oral ingestion. The oil gravitates to the lower lobes of the lungs, where it sets up a granulomatous reaction followed by marked fibrosis and encystment. The fatality of this complication is high.(Thienes & Haley, 1972)
4. Ingestion will cause a burning sensation in the mouth, throat, and stomach followed by vomiting, diarrhea, and belching [Sittig 1991]. The leakage of oil past the anal sphincter is an annoying side effect and an occasional cause of pruritus and that its continuous presence, mineral oil can disturb normal defecatory reflexes. Continuous exposure to mineral oil in large amounts, may impair appetite and worse, may cause massive visceral lipid deposition.(Goodman & Gillman, 1980; Osol, 1980)
5. Exposure to mineral oil mists can cause eye, skin, and upper respiratory tract irritation as well as central nervous system effects like headaches, dizziness, and drowsiness in humans. Liquid petrolatum is essentially innocuous when it comes in contact with human corneas [Grant 1986]. Repeated dermal exposures may result in dermatitis [Genium 1985]. (Irwin & et al, 1997)
6. Mineral oil may be deemed carcinogenic if an initiator like benzo(a)pyrene is present in the oil. Mineral oil is relatively harmless but becomes highly carcinogenic if exposed to extremely high temperatures. The lack of an indicator in mineral oil does not mean that the oil is noncarcinogenic. (Annals of the New York Academy of Sciences, 2002)
According to one source, mineral oil would not pose an health or environmental hazards if the quantity of mineral oil used in animal feed does not exceed 3% per dose nor exceed .06% of the total ration when present in feed or feed concentrates.(Sharon Vennes, 2002)

Question 6. The alternatives to using this substance in terms of practices or other available materials.

Mineral Oil TAP Supplement

CFNP

January 20, 2003

The primary sources of plant based oils are sunflower, canola and soybeans which can be excellent dust suppression alternatives because they are biodegradable, non-toxic and highly effective.

Vegetable based oil can also be used on livestock feed by actually adding nutrients while controlling dust that is harmful if inhaled. The amount of oil used in the feed is little such that it would be nearly impossible for the animal to get too much. It would also minimize the risk of contracting any pulmonary or systemic illnesses from microorganisms and toxins carried in the dust.(Steven Puls, 2002)

Vegetable Oil Rancidity:

One of the concerns with using vegetable oils instead of mineral oil is rancidity. The oil in very small quantity mixed into grain or livestock feed does not deteriorate unless it is exposed to moisture rich environments with microorganisms and the life of the oil itself would be about the same as the feed. Trace minerals including copper and manganese, are prooxidants. They accelerate development of rancidity. One needs a highly saturated fat if you want to ensure stability.

Castor oil appears to be a non-synthetic and sustainable alternative form use in omasal impaction. Otherwise, modification of the diet by improving quality of the roughage and increasing the amount of fiber ingested relieves impaction.

Question 7. Its compatibility with a system of sustainable agriculture.

When considering whether mineral oil use is compatible with a sustainable organic system of production, it is important to recognize possible environmental impacts of processing crude oil (form which mineral oil is derived) and that there are effective alternatives available that may be more compatible with a system of sustainable agriculture.

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Mineral Oil TAP Supplement

CFNP

January 20, 2003

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