United States Department of Agriculture
Natural Resources Conservation Service

Air Quality Enhancement – Agricultural Odor (EAM40)

Agricultural Odor

Agricultural odors are a complex mixture of gases that can evoke a wide range of emotional and physiological responses when encountered via the sense of smell. Objectionable odors are mainly a community or individual perception issue, although some odorous compounds can cause health problems in high concentrations. Many different compounds can be the potential cause for odors from agricultural operations. However, these compounds can generally be classified as volatile organic compounds (VOCs), ammonia, or sulfurous compounds, such as hydrogen sulfide.

Benefits

Application of this enhancement will provide observable improvements in air quality by managing airborne odors from animal production and manure management, storage, and utilization.

Criteria for Agricultural Odor Enhancement Activity

A participant must choose at least one of the activities from the Level I category below OR two or more of the activities from the Level II category below.

Level I Activities

- Implement and/or maintain a biofilters system on enclosed structures to treat exhausts
- Implement and/or maintain a wet or dry scrubber or bioscrubber system on enclosed structures to treat exhausts

Level II Activities

- Inject manure 2 inches or more below soil surface or incorporate applied manure within 24 hours
- Install, maintain, and enhance windbreaks to disrupt wind flow and dilute, intercept, and filter concentrations of odorous substances in the air
- Use odor control additives in animal housing and/or manure storage structures and areas

Air Quality Enhancement – Agricultural Odor (EAM40)

References:

American Society of Agricultural and Biological Engineers Technical Standard EP379.4 Management of Manure Odors, January 2007 (http://asae.frymulti.com/request.asp?search=1&JID=2&AID=23560&CID=s2000&T=2)

Livestock and Poultry Environmental Stewardship Curriculum Lesson 40: Emission from Animal Production System (http://www.lpes.org/Lessons/Lesson40/40_Animal_Emission.html)

Livestock and Poultry Environmental Stewardship Curriculum Lesson 41: Emission Control Strategies for Building Sources (http://www.lpes.org/Lessons/Lesson41/41_Emission_Control.html)

Livestock and Poultry Environmental Stewardship Curriculum Lesson 42: Controlling Dust and Odor from Open Lot Livestock Facilities (http://www.lpes.org/Lessons/Lesson42/42_Controling_Dust_Odor.html)

Livestock and Poultry Environmental Stewardship Curriculum Lesson 43: Emission Control Strategies for Manure Storage Facilities (http://www.lpes.org/Lessons/Lesson43/43_Facility_Emissions.html)

Livestock and Poultry Environmental Stewardship Curriculum Lesson 44: Emission Control Strategies for Land Application (http://www.lpes.org/Lessons/Lesson44/44_Land_Application_Emissions.html)

Schmidt, Jacobson, and Janni, 2001, Preparing an Odor Management Plan, Department of Biosystems and Agricultural Engineering, University of Minnesota Extension Service (http://www.extension.umn.edu/distribution/livestocksystems/DI7637.html)

Schmidt, Janni, and Nicolai, 2004, Biofilter Design Information, Biosystems and Agricultural Engineering Update 18, University of Minnesota Extension Service (http://www.manure.umn.edu/assets/baeu18.pdf)

Clean Air Technology Center Air Pollutant Technology Fact Sheets, U.S. Environmental Protection Agency (http://www.epa.gov/ttn/catc/products.html)

Air Management Practices Assessment Tool, Iowa State University Extension Service (http://www.extension.iastate.edu/airquality/practices/homepage.html)

Air Quality Enhancement – Agricultural Odor (EAM40)

Choose at least one of the activities from the Level I category below OR two or more of the activities from the Level II category below:

Level I Activities:

1. Implement and/or maintain a biofilters system on enclosed structures to treat exhausts (Odor-01)
A biofilter is a layer of organic material (woodchips, straw, compost, or other organic material) through which odorous air from an animal building is passed. Microbes in the organic material convert odorous compounds to more inert compounds, such as carbon dioxide and water. For a complete description of biofilter function, design, and operation criteria, see *Schmidt, Janni, and Nicolai, 2004, Biofilter Design Information, Biosystems and Agricultural Engineering Update 18, University of Minnesota Extension Service (http://www.manure.umn.edu/assets/baeu18.pdf).*

Required Elements:

- Attach design criteria and specifications, and operational specifications, for the biofilter specific to your operation. Include photographs of functioning biofilters on buildings at your operation
- Briefly describe your animal operation (including number of animals, type of facility, and biofilter placement) and your evaluation of the effectiveness of the biofilters to reduce odors coming off your operation

2. Implement and/or maintain a wet or dry scrubber or bioscrubber system on enclosed structures to treat exhausts (Odor-02)
A scrubber is an add-on control device designed to remove air pollutants from an exhaust stream via adsorption of the pollutants to a fixed media filter, a scrubbing liquid, or a combination of the two. A bioscrubber utilizes microbes in the scrubber to consume some or all of the pollutant compounds that are adsorbed. Wet scrubbers and bioscrubbers are effective at reducing both gaseous odorous compounds, as well as particulate to which odorous compounds may be adhered. Dry scrubbers generally have less effectiveness for gaseous odorous compounds, but are effective for particulate removal.

There are a variety of scrubber types that can be used to remove odorous compounds from exhaust air streams. In most cases, a producer should contact an air pollutant control technology design firm to assist in designing an exhaust gas scrubber system that meets the particular requirements (i.e., pollutants to control, size and operational limitations, etc.) for the farm site. The U.S. EPA has also developed fact sheets for many of the most common types of air pollution control technologies (including many types of scrubbers), which can be found at: *http://www.epa.gov/ttn/catc/products.html*.

Air Quality Enhancement – Agricultural Odor (EAM40)

Required Elements:

- Attach design criteria and specifications, and operational specifications, for the scrubber specific to your operation. Include photographs of functioning scrubbers or bioscrubbers on buildings at your operation
- Briefly describe your animal operation (including number of animals, type of facility, and dry scrubber placement) and your evaluation of the effectiveness of the scrubber to reduce odors coming off your operation

Level II Activities:

1. Inject manure 2 inches or more below soil surface or incorporate applied manure within 24 hours (Odor-03)

Directly incorporating solid, or injecting liquid animal manure into topsoil significantly decreases odor emissions, and can have additional fertilization benefits. When utilizing this activity, the cooperator shall not increase soil surface disturbance so that they cannot meet basic eligibility requirements. Any producer using this enhancement activity shall adhere to the relevant air quality design criteria put forth in Conservation Practice Standard 633, Waste Utilization.

Required Elements:

- Provide documentation of the dates, treatment acres, manure type, and manure application method (solid incorporation or liquid injection) for each field for each year of this enhancement

2. Install, maintain, and enhance windbreaks to disrupt wind flow and dilute, intercept, and filter concentrations of odorous substances in the air (Odor-04)

Windbreaks can help manage odors emitted from confined livestock and manure storage facilities. Windbreaks can help mix the odorous compounds vertically in the air by disrupting airflows around animal facilities; they can also intercept solid and liquid particles carrying odorous compounds on leaves and needles, serving as a filter to reduce the amount of odor being carried in the air. Any producer using this enhancement activity shall adhere to the relevant air quality design criteria put forth in Conservation Practice Standard 380, Windbreak/Shelterbelt Establishment.

Required Elements:

- Attach a drawing or aerial photograph of the operation showing the placement of windbreaks with respect to fields and/or animal and manure storage facilities
- Briefly describe your evaluation of the effectiveness of the new or renovated windbreak to manage odors coming off your operation

Air Quality Enhancement – Agricultural Odor (EAM40)

3. Use odor control additives in animal housing and/or manure storage structures and areas (Odor-05)

Odor control additives are combined with manure to reduce production of odorous compounds from the manure. Many additives are an enzyme- or bacteria-based treatment which enhances bacterial populations in the animal manure. Some additives counteract chemical compounds which can cause odor; others absorb or adsorb chemical compounds, or serve as deodorants to mask the generated odors. Some land grant universities have developed guidance, evaluation, and/or recommendations for specific applications of odor control additives, and this information may be helpful in developing the odor control plan. Any producer using this enhancement activity shall adhere to the relevant design criteria put forth in Conservation Practice Standard 591, Amendments for the Treatment of Agricultural Waste.

Required Elements:

- Provide a copy of an odor control additive plan which utilizes additives to reduce odor
- Attach receipts showing purchase of odor control additives for use in the odor control additive plan
- Briefly describe your animal operation, including number of animals, housing type, manure storage facilities, type and quantity of odor control additives you use, and your evaluation of the effectiveness of odor control additives to reduce odors coming off your operation

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CSP Enhancement Certification Sheet

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Participant Acknowledgement Statement:
I agree to apply this enhancement under the terms and conditions of my CSP contract and understand the requirements of the activity.

The participant must choose at least **one** of the activities from the Level I category below OR **two or more** of the activities from the Level II category below--**Note:** If the participant selects another air quality enhancement, the participant will only be paid once for implementing and/or maintaining a particular activity if such activity is required in both enhancements.

Level I activities:

☐ Implement and/or maintain a biofilters system on enclosed structures to treat exhausts

☐ Implement and/or maintain a wet or dry scrubber or bioscrubber system on enclosed structures to treat exhausts

Tier II activities:

☐ Inject manure 2 inches or more below soil surface or incorporate applied manure within 24 hours

☐ Install, maintain, and enhance windbreaks to disrupt wind flow and dilute, intercept, and filter concentrations of odorous substances in the air

☐ Use odor control additives in animal housing and/or manure storage structures and areas

Compensation will be on a per unit basis as described in my CSP contact.

I agree that the following information will be provided to NRCS upon request:

1. Written documentation of the activity performed
2. Copies of dated receipts for equipment or services purchased

I understand that it is my responsibility to obtain all necessary permits and to comply with all laws, regulations and ordinances pertaining to the application of these activities.

Accepted by: _____ **Date:**_____