Appendix D - *Open Lots & Corrals*

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Vegetative Environmental Buffer (VEB)

Description: This practice is a shelterbelt or windbreak of vegetation (trees and shrubs) that deflects and/or adsorbs air contaminates that are emitted from either an animal building or a manure storage basin or pad.

The following are design and maintence considerations for a vegetative environmental buffer.
• A three row vegetative environmental buffer (shelterbelt) incorporating three different tree species is best. Using a row of shrubs (e.g., chokecherry and elderberry), a row of tall growing conifers (e.g., eastern white pine and northern white cedar), and a row of fast growing deciduous trees (e.g., hybrid poplar) is recommended..
• Trees and shrubs should be vigorous and well-suited for the site.
• Locate the vegetative shelterbelt 75 to 100 feet both upwind and downwind from the source (no more than 200 feet away). Ideally the VEB should extend around the entire perimeter of the source of emissions i.e., housing, manure storage or open lot/corral.
• Plants should have 40% to 60% porosity. Porosity expresses how dense the foliage is and is quantified by the simple ratio of plant surface area to the total area.
• Irrigation and weed control are essential to insure plant survivability and maximize early growth
• Trees and shrubs, used as a VEB, must be replanted after 10-15% total plant mortality occurs.
• A long-term plan shall be in place for maintaining the vegetative shelter belt

Rationale: Vegetative environmental buffers can filter, trap, and disperse air pollutants.

Conventional Baseline Practice: The baseline practice for comparison is the absence of any vegetative environmental buffer (trees or shrubs) near the emission source

☒ Established ☐ Demonstration

Farm Component:

- ☐ Nutrition and/or Feed Management
- ☒ Housing
- ☒ Storage & Treatment
- ☒ Open Lots/Corrals
- ☐ Land Application

Notes:

Animal Type:

- ☒ Bovine
- ☒ Swine
- ☒ Poultry

Notes:

Air Toxic Emission Reductions - specific to farm component

☒	Ammonia	10	%	Notes:
☒	Hydrogen Sulfide	10	%	Notes:

Other Air Quality Considerations May reduce particulate matter, volatile organic compounds and odor

Engineering, O&M requirements: In addition to newly planted VEBs, existing, appropriately-designed, VEBs may be considered for emission reductions.

Confirmation that BMP is working:

- ☒ Record Keeping — Notes:
  - ☒ O&M — Frequency:
  - ☐ Design/construction documents
  - ☐ Other specify — Frequency:
  - ☒ Visual Inspection — Frequency:

- ☐ Monitoring — Notes:
  - Parameter: — Frequency:
  - Parameter: — Frequency:

Additional Considerations, references: See NRCS Conservation Practice Standard for Wisconsin 380 - Windbreak/Shelterbelt Establishment, and Practice Standard 650 -Windbreak/Shelterbelt Renovation.

The design of the VEB should consider adverse impacts including snow deposition and restriction of natural air flow.

Open Lot Frequent Cleaning (concrete and earthen surface)

Description: Scrape and remove solid manure from animal lot surfaces at least once every three days during periods, when manure is not frozen. Manure collected from animal lots should be field applied immediately, if conditions allow, or moved to a proper storage facility.

Rationale: Cleaning of open lots reduces exposure of manure to precipitation and avoids anaerobic conditions, thereby reducing hydrogen sulfide emissions. Cleaning open lots reduces exposure of manure to precipitation and wind, reducing ammonia emissions.

Conventional Baseline Practice: The baseline practice for comparison is scraping open lots less often than once every three days.

☒ Established ☐ Demonstration

Farm Component:

- ☐ Nutrition and/or Feed Management
- ☐ Housing
- ☐ Storage & Treatment
- ☒ Open Lots/Corrals
- ☐ Land Application

Notes:

Animal Type:

- ☒ Bovine
- ☐ Swine
- ☐ Poultry

Notes:

Air Toxic Emission Reductions - specific to farm component

- ☒ Ammonia 30 % Notes:
- ☒ Hydrogen Sulfide 30 % Notes:

Other Air Quality Considerations Practice accompanied with proper manure storage and land application will give additional air quality benefits.

Engineering, O&M requirements: The proper storage of manure should be performed in accordance with Table 9 of NRCS conservation practice 313, Waste Storage Facility (June 2009) criteria.

Confirmation that BMP is working:

- ☒ Record Keeping Notes:
  - ☒ O&M Frequency: dates of feedlot cleaning
  - ☐ Design/construction documents
  - ☐ Other specify Frequency:
  - ☒ Visual Inspection Frequency:
- ☐ Monitoring Notes:

Parameter:	Frequency:
Parameter:	Frequency:

Additional Considerations, references: See NRCS Conservation Practice Standard 634 - Waste Transfer and NRCS, Wisconsin Conservation Practice Standard 313 - Manure Storage Standard; Also see Odor Control Practice Specifications contained in Chapter ATCP 51 Wis. Adm. Code. This practice must be done in conjunction with the Feedlane Durable Surfaces practice.

Feedlane - Durable Surfaces

Description: Construct a durable surface, such as concrete, asphalt or other material, adjacent to livestock feeders to reduce areas where mud, urine, and feces accumulation. A curb of one foot or more in height should be installed at the rear of the feedlane, for the entire length of the pad, and scraped at least once every 3 days. The manure may not overflow the curb. The durable surface should be, at a minimum, eight feet wide. The length of the durable surface should be at least equal to that of the feeder. Remove the manure to a proper storage facility.

Rationale: Mixing of feces, urine, and water creates conditions for ammonia and hydrogen sulfide loss.

Conventional Baseline Practice: The baseline practice for comparison is unpaved, earthen feedlanes.

☒ Established ☐ Demonstration

Farm Component:

- ☐ Nutrition and/or Feed Management
- ☐ Housing
- ☐ Storage & Treatment
- ☒ Open Lots/Corrals
- ☐ Land Application

Notes:

Animal Type:

- ☒ Bovine
- ☐ Swine
- ☐ Poultry

Notes:

Air Toxic Emission Reductions - specific to farm component

- ☒ Ammonia 20 % Notes:
- ☒ Hydrogen Sulfide 10 % Notes:

Other Air Quality Considerations

Engineering, O&M requirements:This practice must be prorated based on the feedlane surface areas that are covered with a durable surface.

Confirmation that BMP is working:

- ☒ Record Keeping Notes:
  - ☒ O&M Frequency:
  - ☒ Design/construction documents
  - ☐ Other specify Frequency:
  - ☒ Visual Inspection Frequency: Every 3 days
- ☐ Monitoring Notes:
  Parameter: Frequency:

Parameter: Frequency:

Additional Considerations, references: See NRCS Conservation Practice Standard 313 - Waste Storage Facility. This practice must be performed in conjunction with the Open Lot Frequent Cleaning Practice.

Chemical or Biological Manure Additives

Description: This practice includes the application or incorporation of chemically or biologically active products to accumulated or stored manure solids or liquids to reduce ammonia and/or hydrogen sulfide emissions. Typical modes of action are urease inhibitors, enzymes, pH regulators, oxidizers, and precipitation enhancers.

For poultry, controlling ammonia release from litter is commonly practiced for bird health. Binding ammonium in manure can also be accomplished with products, such as zeolite, or by treating litter/manure with additives such as enzymes. The method to apply and quantity used would depend on the product and would need to follow the manufacturer's recommendation. In this category are litter amendments which can include microbial products that may be applied to litter or incorporated in animal feed.

Alum addition to poultry litter is described separately as an established practice.

Rationale: Broadly, the application of chemical or biological manure additives may reduce ammonia or hydrogen sulfide emissions.

Conventional Baseline Practice: The baseline practice for comparison is no addition of chemical or biological additives to manure.

☐ Established ☒ Demonstration

Farm Component:

- ☐ Nutrition and/or Feed Management
- ☒ Housing
- ☒ Storage & Treatment
- ☐ Open Lots/Corrals
- ☐ Land Application

Notes:

Animal Type:

- ☒ Bovine
- ☒ Swine
- ☒ Poultry

Notes:

Air Toxic Emission Reductions - specific to farm component

☐	Ammonia	%	Notes:	Requires further investigation
☐	Hydrogen Sulfide	%	Notes:	Requires further investigation

Other Air Quality Considerations

Engineering, O&M requirements: Independent, third party scientific documentation, for the specific biological or chemical additive, must be provided.

Confirmation that BMP is working:

☐ Record Keeping Notes:
- ☐ O&M Frequency:
- ☐ Design/construction documents
- ☐ Other specify Frequency:
- ☐ Visual Inspection Frequency:

☐ Monitoring Notes:

Parameter: Frequency:
Parameter: Frequency:

Additional Considerations, references: See NRCS Conservation Practice Standard 591 - Amendments for Treatment of Agricultural Waste.

The use of strong acids by producers may require an additional safe handling certification. Sulfuric acid also increases the sulfur content of farm wastes.

pH reduction of liquid manure (acidification) could either involve a batch treatment (adding acid to the liquid manure storage) or a metering method (metering preferred, since this provides better mixing of the acid to manure) that adds a given rate as manure is transported to the manure storage. Application rate varies but final manure pH should be in the range of 4 to 5. Acidification is not a stand-alone practice for swine and bovine. This practice would likely require solids separation. The liquid portion would be treated with acid. Controlling ammonia by acidification will result in greater hydrogen sulfide emissions, especially for swine.

Some products bind ammonium or inhibit generation of hydrogen sulfide. Lower pH (goal of some chemical additions) leads to a lower proportion of aqueous ammonia and therefore, a lower potential of ammonia volatilization. Acidification does not reduce nutrients, but it does drive the formation of ammonium to ammonia ($NH_3 + H^+$ to NH_4^+) . Ammonium remains in aqueous solution.

Alum addition to bedded manure pack (for cattle) may also reduce ammonia emissions, but increase hydrogen sulfide emissions.