NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

ATMOSPHERIC RESOURCE QUALITY MANAGEMENT

(Ac.)

CODE 370

DEFINITION

A combination of treatments to manage resources that maintain or improve atmospheric quality.

PURPOSE

- Minimize or reduce emissions of:
  - Particulate matter
  - Smoke
  - Odors
  - Greenhouse gases
  - Ozone
  - Chemical drift
- Maintain or increase visibility

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to cropland, forest land, rangeland, roads, feedlots, dairies, poultry, and swine operations and other confined animal feeding operations (CAFOs), equipment yards and staging areas, and other lands that contribute primary airborne particulates (dust, smoke, and chemicals), secondary airborne particulates (ammonia, nitrates (i.e. fertilizers, animal emissions, and animal waste emissions), organic products, odor, greenhouse gases [carbon dioxide (CO_2), nitrous oxide (N_2O), and methane (CH_4)]), greenhouse gases, objectionable odors, and other gases that have a negative impact on air quality.

CRITERIA

General Criteria Applicable to All Purposes

The landowner is responsible for acquiring and following all necessary federal, state, and local permits.

The work shall be performed in compliance with all federal, state, and local laws, rules, and regulations affecting the control of particulate matter, smoke, visibility/haze, ozone, odors, greenhouse gases, and chemical drift in the area of concern.

Specific Criteria Applicable to Reducing Particulate Matter Emissions

Roads. Minimize PM-10 (PM with equivalent aerodynamic diameter of 10 microns or less) generation from unpaved roads, staging areas, and equipment storage areas by reducing traffic and speed, erecting gates for exclusion, treating the area with water, chemicals, soil stabilizers, mulch, or other forms of protection.

Water applied to reduce particulate emissions shall be applied at a rate or in a manner that minimizes potential for tracking mud onto paved roads.

The amount of mud tracked onto paved roads shall be reduced by cleaning equipment before leaving the field or cleaning tracked mud off of paved roads.

Soil stabilizers and other oil or chemical based treatments shall be applied following manufacturer recommendations and label instructions.

Road shoulders and right-of-ways shall be vegetated if soil and climatic conditions permit.

Confined Animals. Manure management plans shall identify non-critical air periods when confined areas can be cleaned without contributing to high PM-10 concentrations in the air.

Management plans to decrease PM-10 and PM-2.5 (PM-2.5 is a particulate matter emission with an equivalent aerodynamic diameter of 2.5 microns or less) production from activities in concentrated animal areas shall include, as appropriate, minimizing depth of uncompacted manure on pen surfaces, sprinkler watering, surfacing, and corral cleaning time tables. Feedlot pen manure harvest shall occur at least once a year. Whether a single annual manure harvest is planned or multiple intermediate manure harvests, a 1-inch to 2-inch layer of well-compacted manure shall be left above the mineral soil at the conclusion of the process.

Sprinkler systems used for water application to achieve particulate emission management, shall meet criteria in Irrigation System, Sprinkler (442).

Sprinkler watering to reduce PM-10 releases from feedlots shall be managed to minimize odor and ammonia emissions from wet manure as well as prevent sprinkler water runoff.

Animal feed shall be mixed in an enclosed area, in an area protected from the wind, or during low wind periods to minimize dust from animal feed processing.

Feed and manure additives shall be utilized to minimize ammonia production and loss to the air. (see Feed Management (592))

The amount, method, and timing of animal waste storage and disposal shall be managed in conjunction with other practices to minimize ammonia volatilization losses from the waste.

Cropland. Methods and procedures that reduce on-field particulate matter generation prior to and during land preparation and crop harvesting shall be implemented.

Particulate matter reducing methods that shall be evaluated for implementation include: reduction of land disturbing tillage passes, introduction of wind barriers (windbreaks), reduced soil tillage passes during windy periods, performance of tillage practices under slightly higher moisture or higher humidity conditions, adoption of GPS and precision farming practices, reducing spraying activities, and adoption of precision irrigation practices.

Residue Management (No Till/StripTill (329), MulchTill (345), or Ridge Till (346)) shall be used to reduce the generation of particulate matter from agricultural operations on cropland.

Cover crops shall be established on fields susceptible to PM-10 generation during vulnerable periods. (see Cover Crop (340))

Cover crops shall be planted between the rows in orchards, groves, and vineyards to minimize PM-10 generation during harvest operations.

Mowing operations shall be done in a manner which minimizes the generation of particulate matter.

Proper applications of fertilizers, in rates and application techniques, shall be implemented to reduce the loss of ammonia through volatilization. (see Nutrient Management (590)) Lower fertilizer product volatility formulations shall also be used. These actions will reduce the formation of secondary fine particulate formation (PM-2.5).

Specific Criteria Applicable to Reducing Smoke Emissions

When burning, follow all procedures specified in the prescribed burn policy including identification of off-site impacts.

Specific Criteria Applicable to Reducing Odor Emissions

Waste Utilization (633) shall be used to reduce the amount of odor during manure spreading operations.

Windbreak/Shelterbelt Establishment (380) shall be sited to minimize the movement of odor away from an odor-producing source to a sensitive area. Tree varieties and placement for the windbreak shall be managed to maximize odor interception and mixing of air, and reduce odor leaving the source.

Specific Criteria Applicable to Reducing Greenhouses Gas Emissions

Management plans to increase carbon sequestration in organic matter and soil and offset CO_2 emissions to the atmosphere shall specify the frequency and intensity of tillage activities.

Plans to provide renewable energy sources and offset greenhouse gas emissions through biomass removal shall specify the amount and timing of the biomass removal.

Sufficient biomass shall be left on the surface to maintain soil quality and to achieve the planned soil loss reduction objective.

Reduction of methane emissions from animal waste storage shall be accomplished using an appropriate anaerobic digester, flares, or other approved methane reduction technology.

Nitrogen fertilizers shall be applied to croplands and rangelands in a manner which minimizes the loss of nitrous oxide (N_2O) to the air. (see Nutrient Management (590))

Specific Criteria Applicable to Reducing Ozone

Minimize the emissions of NOx, volatile organic compounds (VOCs), and other ozone precursors from farm equipment, irrigation engines, livestock, and agricultural burning.

Specific Criteria Applicable to Reducing Chemical Drift

Reduce volatile organic compounds from pesticide application by changing formulations and adapting methods of application.

Minimize chemical drift during pesticide applications.

Site-specific application criteria listed on chemical labels shall be followed to address environmental hazards. Guidelines in Pest Management (595) shall be followed to reduce drift.

Site-specific application criteria listed in the Nutrient Management (590), Waste Utilization (633), or Irrigation System, Sprinkler (442) hardware or management criteria shall be followed to address environmental hazards.

CONSIDERATIONS

Secondary particulate matter is derived from emissions of ammonia, nitrates (i.e. fertilizers, animal emissions, and animal waste emissions), organic products, odor, greenhouse gases [carbon dioxide (CO_2), nitrous oxide (N_2O), and methane (CH_4)], ozone, and chemical drift.

Particulate Matter. As this practice is used to address primary PM concerns, care must be taken that treatment component management (i.e. sprinklers for dust control) selected to reduce primary particle emissions do not result in nuisance odors and significant emission increases in greenhouse gases and volatile organic compounds.

Where appropriate, conservation plans which identify wind erosion controls should evaluate those controls for their PM-10 reductions.

Consider strategies to reduce peak animal movement during late afternoon hours. Increases in stocking density (up to 100 percent increase) through the use of temporary or permanent fencing may also reduce dust concentrations.

Manure harvesting and dust scraping on open lots and corrals should be restricted to time periods in which one or more of the following conditions is present so as to minimize adverse impact on air quality from suspended PM:

- Wind direction is reasonably stable and oriented such that airborne PM generated by manure-harvesting practices is carried away from critical nearby receptors not associated with the animal feeding operation; including, but not limited to, public roadways, residences, businesses, and publicly owned buildings
- Weather conditions are conducive to atmospheric mixing, including moderate winds (>5 mph, and <25 mph), warming temperatures, and abundant solar radiation
- Manure moisture content is sufficient to reduce dust potential substantially (>25 percent water by mass)

Acceptable material for reducing particulate emissions from unpaved roads includes water, hygroscopic (water-attracting) materials such as magnesium or calcium chloride, petroleum emulsions, polymer emulsions, bituminous materials, and mulch.

Moving towards a less intensive tillage system (Residue Management, No Till/Strip Till (329)) will reduce particulate matter generation and enhance soil carbon sequestration.

Because residue management practices normally use fewer trips across the field, they will also reduce the amount of particulates, nitrogen oxides (NOx), and volatile organic compounds (VOCs) from internal combustion engines.

The speed at which field operations are done influences PM generation. In general, slower speeds reduce particulate emissions.

Use tillage methods and/or equipment that have been proven to reduce particulate matter generation.

Where critical downwind receptors include well-traveled roadways exhibiting a predictable, cyclical traffic load, manure harvesting practices should be conducted during low-traffic periods. Similar public-exposure considerations apply when critical downwind receptors are residences, schools, businesses, hospitals, and other structures, facilities, or land uses at which the frequency or timing of human exposure to low air quality can be reasonably predicted and mitigated.

Instead of burning tree-trimming wastes, they can be chipped/shredded and used for composting or as mulch on unpaved roads or other areas that produce particulate emissions.

Irrigation water can be applied to soil surfaces to reduce particulate matter generation.

Mulches, oils, and tree saps can be used on critical areas to help reduce particulate matter generation.

Reduce or limit turning of equipment and vehicles on paved roads to reduce the amount of soil tracked onto roads.

Controlling speed and access on unpaved roads will reduce the generation of particulate matter.

Using cleaner burning fuels, such as natural gas, will reduce the emission of ozone precursors, nitrogen oxides (NOx), and volatile organic compound (VOCs) from farm engines.

Irrigation Water Management practices which will maximize water use efficiency, or engine and pump operating efficiency will reduce emissions of nitrogen oxides, PM, and VOC from internal combustion or electric power generation.

Smoke. Use alternative disposal methods for other combustible materials such as bags, sacks, and domestic waste that will be more environmentally beneficial.

Burns initiated for management of grass or forest land shall meet criteria in Prescribed Burning (338).

Odor. Anaerobic digesters can be constructed for odor control and methane capture. Biofilters can be constructed at exhaust fan outlets of animal housing facilities to reduce odors.

Consider Feed Management (592) and Animal Mortality Facility (316) to reduce odor generation.

Keep manure as dry as practical and maintain aerobic conditions where possible.

Prevent the formation of stagnant or standing water in feedlot areas. Avoid long-term stock-piling of manure and locate piles as far as possible upwind of neighboring properties.

Greenhouse Gases. In order to reduce the amount of greenhouse gases reaching the atmosphere, the reduction and/or capture of greenhouse gases is necessary. This may be accomplished by reducing the amount generated or capturing the gases before they are released into the atmosphere.

Agricultural activities contribute CO_2 (Carbon Dioxide) emission through combustion of fossil fuel, burning, decomposition of soil organic matter, and biomass burning. Adoption of conservation tillage and other energy efficient farming methods can reduce use of fossil fuels and thus reduce CO_2 emissions.

Carbon sequestration models such as Century can be utilized to obtained estimates of carbon stored in the soil.

Reduce nitrogen losses as N_2O through the use of fertilizer type, amount, and application timing and method, as described in Nutrient Management (590).

PLANS AND SPECIFICATIONS

Plans for atmospheric resource quality management that are elements of a more comprehensive conservation plan shall recognize other requirements of the conservation plan and be compatible with them.

Plans and specifications for atmospheric resource quality management shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

For livestock operations this will include the type of manure harvesting system used and the planned schedule of manure utilization or disposal.

Plans and specifications will be listed separately to address particulate matter, smoke, odor, and greenhouse gas management. Plan narratives or job sheets will address identified atmospheric resource concerns to meet quality and condition criteria.

Specifications shall be recorded using approved specifications, job sheets, narrative statements in the conservation plan, or other acceptable documentation.

The location of all supporting practices used will be shown on the drawings or conservation plan map.

OPERATION AND MAINTENANCE

The conservation plan should include operation and maintenance (O&M) items needed to continue treatment of atmospheric resource related concerns.

REFERENCES

USDA-NRCS, National Environmental Compliance Handbook

USDA-NRCS, Cultural Resources Handbook