

NATURAL RESOURCES CONSERVATION SERVICE
MONTANA CONSERVATION PRACTICE STANDARD

ATMOSPHERIC RESOURCE QUALITY MANAGEMENT (ACRE)

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 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 (CO₂), nitrous oxide (N₂O), and methane (CH₄)], (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 local, state, Tribal, and federal permits.

The work shall be performed in compliance with all international, 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 generation from unpaved roads, staging areas, and equipment storage areas by treating with water, chemicals, soil stabilizers, mulch, or other cover. **Alternate PM-10 controls include: reduction of number of vehicle trips, erecting gates for exclusion, and reducing speed.**

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.

Confined Animals. Minimize PM-10 generation from confined animal housing, holding, and corral areas. 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 production from activities in concentrated animal areas shall include, as appropriate, maintaining minimum manure depths, sprinkler watering, surfacing, and corral cleaning time tables.

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

NRCS, MT
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Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard contact the Natural Resources Conservation Service.

NOTE: This type of font (**AaBbCcDdEe 123..**) indicates NRCS National Standards.
This type of font (**AaBbCcDdEe 123..**) indicates Montana Supplement.

Sprinkler systems within corrals and holding areas used for water application to achieve particulate matter emission management shall meet criteria in the Field Office Technical Guide (FOTG), Section IV, Conservation Practice, Irrigation System, Sprinkler (Code 442).

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

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

The amount, method, and timing of animal waste storage and disposal shall be managed in conjunction with other practices such as direct injection, timely incorporation, see FOTG, Section IV, Conservation Practices, Composting Facility (Code 317), or Waste Facility Cover (Code 367) to minimize ammonia volatilization losses from the waste.

Cropland. Residue management (code 329A, 329B or 329C) shall be used to reduce the generation of particulate matter from agricultural operations on 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 (wind breaks), reduced soil tillage passes during windy periods, performance of tillage practices under slightly higher soil moisture or higher humidity conditions, adoption of GPS and precision farming practices, reducing spraying activities, adoption of precision irrigation practices.

Cover crops or other wind erosion control practices shall be established on fields that are highly erodible and susceptible to PM-10 generation during vulnerable periods (see conservation practice standard Cover Crop, code 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. Lower fertilizer product volatility formulations shall also be used. These actions will reduce the formation of secondary fine particulate formation (PM2.5).

Specific Criteria Applicable to Reducing Smoke Emissions

Burns initiated for management shall meet criteria in FOTG, Section IV, Conservation Practice, Prescribed Burning (Code 338).

When burning, follow all procedures specified in agency burn policy including identification of off-site impacts. **In impacted air sheds designated as non-attainment for particulates, practices shall be implemented that reduce or eliminate burning of agricultural residues unless required for disease control.**

In air sheds that impact Class I regional haze areas, burn or smoke management plans shall be followed. **When burning, all procedures specified in local, state, or federal agencies burn policies shall be followed including identification of off-site impacts.**

Specific Criteria Applicable to Reducing Odor Emissions

The amount, method, and timing of animal waste storage and disposal shall be managed in conjunction with other practices such as direct injection, timely incorporation, see FOTG, Section IV, Conservation Practices, Composting Facility (Code 317), or Waste Facility Cover (Code 367) to minimize ammonia volatilization losses from the waste.

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

Windbreaks (practice code 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 dilution 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 CO₂ 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 objective.

Reduction of methane emissions from animal waste storage shall be accomplished using an appropriate anaerobic digester 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 (N₂O) to the air (see conservation practice standard Nutrient Management, code 590, **Additional Criteria to Protect Air Quality by Reducing Nitrogen and/or Particulate Emissions to the Atmosphere.**

Specific Criteria Applicable to Reducing Ozone

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

Installation of new certified diesel, propane, natural gas or electric motors will significantly reduce oxides of nitrogen (NO_x) emission. Reduction in agricultural residue burning will reduce both NO_x and VOCs.

Reduce volatile organic compound emissions from pesticide application by changing formulations and adoption of advanced application technology methods. Utilizing less pesticide sprays, lower VOC emitting pesticides, or alternative formulations will reduce VOC emissions. Refer to FOTG, Section IV, Conservation Practice, Pest Management (Code 595), as a guide. Proper management of animals and animal waste in corrals, manure storage, manure composting, and proper on-land disposal of manure will reduce VOC emissions into the atmosphere.

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. **Wind speed, time of application, application equipment, and application rates shall be addressed at time of application. Site-specific application criteria listed on chemical labels shall be followed to address environmental hazards.**

CONSIDERATIONS

Particulate matter. Where appropriate, conservation plans which identify wind erosion controls should evaluate those controls for their PM-10 reductions. **PM non-attainment areas are identified by Montana DEQ. See <http://www.deq.mt.gov/AirQuality/Planning/AirNonattainment.asp>**

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 (CO₂), nitrous oxide (N₂O), and methane (CH₄)], ozone, and chemical drift and increasing or maintaining visibility.

Moving towards a less intensive tillage system (Residue Management, No-till/strip-till, code 329A) will reduce particulate matter generation and enhance soil carbon sequestration.

Use tillage methods and/or equipment that have been proven to reduce particulate matter generation. **Example: Multiple tillage practices completed in one pass or use of one pass tillage equipment. Because residue management practices normally use fewer trips across the field, they will also reduce the amount of particulates, NO_x and VOCs from internal combustion engines.**

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. **Residues can also be sent to biomass plants or composted.**

Irrigation water can be applied to soil surfaces to reduce particulate matter generation. **Care must be taken that treatment component management (i.e., sprinklers for dust control) selected to reduce primary particulates do not result in nuisance odors and significant emission increases of greenhouse gases and volatile organic compounds (VOC).**

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

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

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 (NO_x) and volatile organic compound (VOCs) from farm engines.

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

- 1. 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 operation. Primary critical receptors can include: public roadways, residences, businesses, parks, schools, and publicly-owned buildings;**
- 2. Weather conditions are conducive to atmospheric mixing, including light to moderate winds, warming temperatures, and abundant solar radiation;**
- 3. Manure moisture content is sufficient to reduce dust potential substantially (>25% water by mass).**

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

beneficial. **Round trip (returnable) containers as well as recyclable containers can also be utilized.**

Odor. Anaerobic digesters can be constructed for odor control and methane capture.

Consider feed management to reduce odor generation (see FOTG, Section IV, Conservation Practices, Animal Mortality Facility (Code 316) or Waste Facility Cover (367) to reduce odor generation).

Biofilters can be utilized at exhaust fan outlets of animal housing facilities to reduce odor emissions.

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.

Reduce nitrogen losses as N₂O through the use of fertilizer type, amount and application timing and method, as described in conservation practice Nutrient Management, code 590).

Agricultural activities contribute CO₂ (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 fuel and thus reduce CO₂ emissions.

Carbon sequestration tools such as the Century Model can be utilized to obtain estimates of carbon stored in the soil and comparisons of savings using various tillage/crop rotation scenarios.

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.

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.

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

Ozone. Ozone is formed from precursors reacting in the atmosphere with sunlight. Ozone precursors include oxides of nitrogen (NO_x) and Volatile Organic Compounds (VOC's). Agricultural practices such as: burning of agricultural residues, volatilization of applied pesticides, raising of animals, storage and on-land application of livestock manure contribute to higher VOC levels in the atmosphere. Agricultural practices that contribute to NO_x emissions include agricultural burning, use of motorized farm equipment, and stationary and mobile agricultural engines.

Utilization of Integrated Pest Management (IPM) can include certain reductions in the amount of pesticides used. Utilizing IPM practices will utilize the least amount of pesticides while maintaining control of pests.

Utilizing organic cropping practices will provide the greatest reduction of pesticide applications and provide the largest reduction in VOC volatilization when compared to past higher pesticide application cultural practices.

Using cleaner burning fuels, such as natural gas and propane, or installation of electric motors, will reduce the emission of ozone pre-cursors oxides of nitrogen (NO_x) and volatile organic compounds (VOCs) from farm engines.

OPERATION AND MAINTENANCE

The conservation plan should include operation and maintenance items needed to continue treatment of atmospheric resource related concerns.

Records shall be kept in accordance with associated practices and Federal, state and local laws.

REFERENCES

[Environment Technical Note, MT-7, Atmospheric \(Air\) Quality Assessment Tool for Montana. USDA-NRCS. September 2008.](#)