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Natural Resources Conservation Service

Air

Resource Concerns

Particulate Matter

Air Quality Impacts - Particulate Matter

Direct emissions of particulate matter (PM) – dust and smoke – as well as the formation of fine particulate matter in the atmosphere from other agricultural emissions – ammonia, NOx, and VOCs.

What is it?

Particulate matter is classified by its size where PM2.5 and PM10 have an aerodynamic diameter less than 2.5 and 10 micrometers, respectively. PM2.5 is directly emitted to the atmosphere by combustion processes (vehicles, fire) and to a lesser degree by mechanical means such as dust from roads or tillage. PM2.5 is also formed in the atmosphere by chemical reaction of PM precursor gases; oxides of nitrogen (NOx), volatile organic compounds (VOCs) and ammonia (NH_3). Sources of these PM precursor gases can be engines, fertilizer application, and animal operations. Much of PM10 is mechanically generated and directly emitted to the atmosphere by actions that disaggregate the soil such as tillage operations, road and field travel, animal movement, harvesting and wind erosion. Larger PM is typically geologic in origin.

Why is it important?

Particulate matter in the atmosphere can be a human health issue and lead to visibility degradation. It can also impact ecosystems when it deposits out of the atmosphere. The body's natural defenses can filter out larger particles, but smaller particles can get past the nasal passageways getting into the lungs. PM can also create poor visibility which affects transportation (ex. dust or smoke) and federally protected scenic vistas. Deposition may adversely affect ecosystems by causing nuisance dusting, changing pH balance, damaging plants or by adding additional nitrogen to the environment.

What can be done about it?

Reducing field operations by using residue management and precision farming reduces PM. Plants protect soil from disturbance and intercept PM after it is lifted into the atmosphere. Reducing vehicular miles and speed or treating unpaved roads with a suppressant can reduce dust. For combustion sources, smoke management, alternatives to burning, wildfire risk reduction, engine replacement and retrofits reduce PM and PM precursor emissions. For animal operations, cleaning and ventilating livestock houses, maintaining moisture content in open lot surfaces, periodically removing manure, covering the surface of storage piles, and removing feed and manure from storage piles in a manner that minimizes surface disturbance can all reduce PM and PM precursor emissions. Windbreaks can intercept airborne PM and modify the wind patterns such that PM entrainment and transport are reduced.

Particulate Matter at a Glance

Problems / Indicators - Dust, smoke, chemical and fertilizer use, animal activities	
Causes	**Solutions**
• Unpaved roads • Bare/exposed agricultural fields • Operations on agricultural fields • Chemical applications • Combustion (engines, burning) • Animal operations	• Reduce travel/speed and treat unpaved roads • Residue management, precision farming • Wind barriers • Smoke management, wildfire risk reduction • Engine replacement and retrofit • Open lot manure harvesting/removal and coverage • Animal housing maintenance and ventilation

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