Timing Biosolids Handling and Application Practices

Helping to Reduce Nitrogen Impacts at Rocky Mountain National Park

What is the issue and who is involved?

Nitrogen emissions from a variety of man-made sources, including ammonia from biosolids handling and application, contribute to excess atmospheric nitrogen deposition at Rocky Mountain National Park (RMNP) in Colorado. In 2006, Colorado's crop and livestock producers and researchers at Colorado State University (CSU) began collaborating with the National Park Service (NPS), the Colorado Department of Public Health and Environment (State), and the U.S. Environmental Protection Agency, to address nitrogen deposition impacts at RMNP. With the help of Colorado agriculture and biosolids applicators, nitrogen deposition can be reduced and the nutrient balance can be improved.

Why is excess nitrogen harmful to Rocky Mountain National Park?

Although nitrogen is an important part of the park's ecosystems, deposition of excess atmospheric nitrogen at twice the tolerable rate is impacting natural resources. Three-quarters of the park is above 9000 feet where high elevation ecosystems, developed under low nutrient conditions with thin, granitic soils are especially susceptible to excess nitrogen. Within these ecosystems, alpine tundra, aquatic plants, soil and water quality are most affected. Scientists are also concerned that excess nitrogen may promote non-native plants and reduce forest health. The NPS monitors nitrogen deposition rates and impacts in order to protect RMNP resources for the enjoyment of this and future generations.

What are the sources of excess atmospheric nitrogen?

Nitrogen in the atmosphere comes from a variety of natural and man-made sources. Sources of man-made or excess atmospheric nitrogen include power plants, vehicle exhaust, oil and gas production, wastewater treatment plants, landfills, fertilized crops, livestock production, composting, and biosolids application, as well as municipal and residential activities such as lawn care and waste disposal. Research shows that excess nitrogen comes into RMNP from both urban and rural areas in Colorado as well as from other states.

How is atmospheric nitrogen transported into the park?

Winds blowing from the west regularly transport nitrogen and deposit it into RMNP. In addition, past weather data and recent research show that common spring and summer weather events, with upslope winds from the east, are transporting and depositing nitrogen in the park. During these weather events, nitrogen is transported by wind, combined with moisture in the air, and then deposited in the park by rain or snow.

What is being done about it?

Biosolids Application Best Management Practices can help!

State and federal agencies are working with industry to reduce significant sources of nitrogen emissions. The State is using nitrogen oxide reduction strategies including engine regulations, vehicle standards, and power plant controls to achieve a 37% reduction in statewide nitrogen oxide emissions by 2018. In addition, Colorado's crop and livestock producers are exploring ways to further reduce agriculture's contribution.

Research at CSU is focused on identifying and refining voluntary best management practices (BMPs) for agricultural production activities to improve efficiency and reduce nitrogen emissions from ammonia. Potential BMPs for reducing ammonia losses from biosolids applications include:

- Injecting or incorporating biosolids as soon possible after application
- Avoiding surface applications on windy days or onto bare soils
- Amending calcareous soils to ensure pH is less than 8 before application of biosolids

One promising BMP in development by the Colorado Livestock Association and CSU is an "early warning system." This system would advise agricultural producers, biosolids applicators, and composters to avoid high nitrogen-emitting activities, such as certain methods of manure and biosolids handling and crop fertilizing, during specific weather events that could readily transport nitrogen into RMNP. **The system is equally applicable to biosolids application activities and may help inform timing and/or locations of biosolids handling and application activities on warning days.**

Why should biosolids applicators care about voluntary ammonia emissions reductions?

Voluntary implementation of ammonia reducing BMPs will benefit Colorado by:

- Increasing nitrogen use efficiency resulting in the use of less nitrogen for crop production, keeping more on the farm for production, and providing a higher value product to customers.
- Allowing agricultural producers the opportunity to refine BMPs that are culturally and operationally acceptable and economically viable.
- Reducing the need for mandatory BMPs or regulations in the future.
- Extending land stewardship by helping to address current ecosystem impacts and avoid future impacts to Colorado's natural systems.
- Helping to reduce nitrogen deposition impacts and preserve RMNP and other lands for the enjoyment of this and future generations.

How can biosolids applicators get involved?

Sign-up to participate in the warning system at www.rmwarningsystem.com. This will allow you to receive warnings in advance of weather events that carry nitrogen into RMNP for counties that you select 2-3 days in advance of the event. When you receive a warning, simply respond by indicating whether or not you are able to change application locations or practices for the period indicated. Your participation will help make a producer-friendly and effective system that will preserve our natural resources at RMNP, while allowing for needed flexibility for agricultural producers, biosolids applicators, and composters.

For more information:

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RMNP air quality websites:
www.colorado.gov/cdphe/rmnpinitiative
www.nature.nps.gov/air/Permits/aris/romo
http://naqsat.tamu.edu