Air Quality Enhancement Activity– AIR02 –Nitrogen Stabilizers or Urease Inhibitors for Nitrous Oxide Control

Enhancement Description
The use of nitrogen inhibitors with ammonia and ammonium fertilizers or the use of urease inhibitors for surface applied urea products to control the rate of ammonia and ammonium conversion. This enhancement applies to those climatic areas and soils where either nitrogen stabilizers or urease inhibitors are recommended by the Land Grant University. This enhancement is only applicable to nitrogen applied within 30 days of planting. This does not apply to "pop-up" or starter nitrogen sources applied at planting time.

Land Use Applicability
Cropland and pastureland.

Benefits
Including a nitrification inhibitor with ammonia-based nitrogen applications will help to control conversion of ammonia to nitrate and ultimately to nitrogen gas through nitric oxide (an ozone precursor) and nitrous oxide (a greenhouse gas). These conversion processes can produce nitrous oxide as a byproduct due to inefficiencies in the conversion processes. Nitrous oxide is a potent greenhouse gas which has 310 times the global warming potential of carbon dioxide on a molecular basis. Using a nitrification inhibitor with applied ammonia-N will help to reduce an enterprise's nitrous oxide emissions, and improve its overall greenhouse gas footprint. Additionally, it can help to keep more nitrogen in a plant-available form in the soil for a longer period of time.

Including a urease inhibitor (with surface applied urea products) will help reduce the volatilization and release of ammonia into the atmosphere that occurs as the urea hydrolyzes. Urease, which is the enzyme from yeast and bacteria in the soil, catalyzes the hydrolosis of urea into carbon dioxide and ammonia. Ammonia emissions are particularly important to air quality because ammonia is a pre-cursor for PM2.5.

Criteria for Including Nitrification Inhibitor and/or Urease Inhibitors with Nitrogen Application

1. Use either a nitrification inhibitor or urease inhibitor product (depending upon the type of nitrogen fertilizer used) that is recommended by the Land Grant University for the soils on the treatment acres.
2. Nutrient application rates must be within Land Grant University recommendations based on soil tests and established yield goals considering all nutrient sources. The nutrient

application rate must take into account the additional nitrogen that will remain available to the plant due to the inhibition of the nitrification processes.

3. The use of the nitrification inhibitor or urease inhibitor must be in accordance with the manufacturer-recommended rates.
4. Use of the nitrification inhibitor or urease inhibitor must not increase soil surface disturbance.
5. This enhancement is only applicable for nitrogen applications that take place within 30 days of planting time.

Documentation Requirements for applying nitrification inhibitors to cropland

- A map showing where the enhancement was applied.
- Date(s) of application of ammonia-N fertilizer and nitrification inhibitor.
- Acres of land treated.
- Soil test results.
  - Manure analysis results.
  - Crops grown and yields (both yield goals and measured yield).
  - Calibration of application equipment.

References

Nelson, D. R., and D. Huber. Nitrification Inhibitors for Corn Production. National Corn Handbook, Iowa State University. Available at: http://www.extension.iastate.edu/Publications/NCH55.pdf

Rankin, M. Nitrification Inhibitors and Use. University of Wisconsin Extension. Available at: http://www.uwex.edu/ces/crops/ninhib.htm

The Pennsylvania State University 2003, Agronomy Facts 51, Starter Fertilizer http://cropsoil.psu.edu/extension/facts/agfacts51.cfm

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The use of urease or nitrification inhibitors is necessary to qualify for this enhancement. Urease or nitrification inhibitors function by reducing the population or inhibiting the activity of the soil bacteria responsible for converting Nitrogen into forms (nitrate and nitrogen gas) that can be lost from the soil profile. Current products on the market include N-Serve (NBPT), Agrotain, Instinct, Super-U and Nutrisphere-N. Written documentation shall include documentation of the fertilizer product name, method of stabilization, formulation and method of application. Slow release requirement is not applicable to starter fertilizers.