DNR Regulations and Manure Irrigation

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2013 Manure Irrigation Symposia

Today

- About dozen farms have or currently use irrigation equipment to land apply liquid manure
- Most are CAFOs; only few fields used
- Most apply 'treated' manure (digested or separated)
- Most use center pivots (with drop nozzles)
- More CAFO's want to use manure irrigation on more fields

Manure Irrigation Methods

- Center Pivots
- Traveling Guns




Regulatory Requirements - Setbacks

•CAFO's must comply with NR 243 and NR 214 setback requirements:

- 25-100 feet from navigable waters and conduits – 243
- 500 feet ** from homes – 214
- 250 feet from drinking water wells – 214
- 1000 feet from municipal wells -214
- 5 feet separation from bedrock and groundwat
- 100 feet from direct conduits to groundwater – 243

** = From nearest edge of application. Greater distance may be required depending on distribution system and potential for public health impacts

Regulatory Requirements

•CAFO's must comply NR 243 Land Application Practices:

- Department approved Nutrient Management Plan
- Maximize use of nutrients for crop production and minimize loss and delivery to state waters
- Retain land applied manure or process wastewater on the soil where they are applied with minimal movement
- No runoff from field or discharge to tiles during dry or wet weather (< 25yr /24 hr)
- No ponding or application on saturated soils
- No fecal contamination of a well

Regulatory Requirements

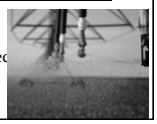
•CAFO's must comply NR 214 Land Application Practices:

- Department approved Management Plan for:
  - Optimizing treatment system performance
  - Annual soil testing
  - Load and Rest schedules
  - Scheduled Maintenance
  - Operational strategies for periods of adverse weather (e.g., rain, wind, etc.)
  - Monitoring procedures and other pertinent information
- Other practices (next slide)

Regulatory Requirements

•CAFO's must comply with NR 214 Land Application Practices:

- Wastewater application shall be limited to rate that can infiltrate into the soil surface and prevent ponding and runoff
- Spray nozzles shall be arranged so wastewater is evenly distributed over acreage applied
- Spray nozzles shall be sized to prevent plugging and located as near to the ground surface as practicable to minimize wind drift of wastewater
- Average hydraulic application rate may not exceed 10,000 gal/acre per day



Regulatory Requirements

- Smaller size farms do not have to meet NR 243 and NR 214 requirements
- Towns and County Concerns
  - Increased Odors and Possible Public Health Impacts
  - Prohibition on Irrigation (temporary or permanent)
    - Impacts CAFO and smaller size farms
  - Road Weight Limits for trucks/tankers

Manure's Double-Edged Sword

Manure as Asset

Manure field-application is a cost-effective and sustainable approach for optimal soil tilth and fertility

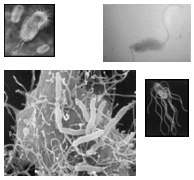
Manure as Liability

Manure may contain pathogens harmful to both humans and livestock

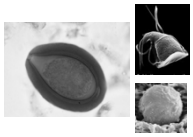
DNR Goal: Maximize beneficial uses of manure while minimizing environmental and public health risks

Pathogens in Cattle Manure

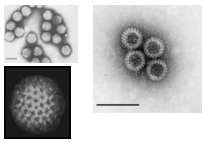
Bacteria (e.g., *Campylobacter, Salmonella, E. coli* O157:H7)



Protozoa, (e.g., *Cryptosporidium, Giardia, Eimeria)*



Viruses (e.g., adenovirus, enterovirus, rotavirus)



Manure Irrigation - Pros

- Reduce hauling costs and road damage/impacts
- More flexibility/time to apply manure
- More Precise Nutrient Management
  - Sources (N and P), timing, amounts
- Better surface and ground water protection
  - Less risk for manure surface runoff
  - Reduce leaching below root zone
  - Reduce entry into drain tiles
  - Fewer spills

Manure Irrigation - Cons

- Increased odors and air emissions
- Increased drift risk compared to other manure application methods
- Possible health risk from air pathogens
  - Inhalation
  - Deposition on surfaces

Reducing Manure Irrigation Risks

- DNR approval of manure irrigation fields – via NM plan and Plans and Specs
- Operate in appropriate locations
- Management plans to minimize drift and pathogen survival
  - setbacks
  - equipment types and operational methods
  - weather and other high risk conditions
  - monitor applications for drift
  - calibrate equipment
- Treatment via Digesters/Separation
- RESEARCH

UW Manure Irrigation Research - 2 yr DNR funded study – $338,000

- Two different application systems
  - Traveling gun (2012-2013)
  - Center pivot (w/drop nozzles) (spring/summer 2013
- Assess pathogen drift impacts from:
  - Wind velocity and direction
  - Solar intensity
  - Temperature/relative humidity
- Model drift factors; evaluate setback distances
- QMRA – Quantitative Microbial Risk Assessment

Manure Irrigation items to address

- Drop nozzles and other equipment
- Droplet size
- Wind breaks
- Irrigation rates, pressures
- Pathogen content and fate
- Alternative inexpensive monitoring
- Drift modeling and Risk Assessment
- Manure Treatment
  - Anaerobic digestion
  - Dilution or separation

Develop and evaluate models to create a SCIENCE based assessment