

# Ambient Air Quality & Feedlots

Minnesota's Regulations, Program,  
Procedures, and Experiences



# History of Minnesota Ambient Air Quality Regulations

- Minnesota Ambient Air Quality Standards (MAAQ's)
  - Promulgated in 1969
  - Nine Pollutants
    - H<sub>2</sub>S, Ozone, CO, SO<sub>2</sub>, PM, NO<sub>2</sub>
    - Updates for several pollutants but not H<sub>2</sub>S
  - “Bright Line” enforceable standards
    - Primary standard set to protect human health
      - Sensitive groups may experience symptoms at lower levels



# History of Minnesota Ambient Air Quality Regulations

- Health Risk Values (HRV)
  - Numerous Pollutants
    - Includes some of the MAAQ's Pollutants
  - Prevent health effects even in sensitive groups
    - Thresholds lower than the MAAQ's
  - Not an enforceable standard
    - Level at which more study may be needed



# Minnesota Hydrogen Sulfide Regulations

- Ambient Air Quality Standard
  - 50 ppb (70  $\mu\text{g}/\text{m}^3$ )
    - $\frac{1}{2}$  hr avg not to be exceeded more than twice a year
  - 30 ppb (42  $\mu\text{g}/\text{m}^3$ )
    - $\frac{1}{2}$  hr avg not to be exceeded more than twice in any 5 consecutive days
- Inhalation Health Risk Value
  - 7 ppb
    - 13 week avg



# Minnesota Ammonia Regulations

- Ambient Air Quality Primary Standard
  - None
    - Recent (90's) MPCA monitoring has shown that ammonia quickly dissipates
- Inhalation Health Risk Value
  - 3,200  $\mu\text{g}/\text{m}^3$ 
    - One hour avg
  - 80  $\mu\text{g}/\text{m}^3$ 
    - Annual avg



# Ambient Air Quality Standard Applicability for Feedlots

- Applies to all feedlots
- Measured at the property line
  - Unless general public has access
  - Air quality easement
    - Obtained from adjacent property owner
    - Must be in writing
    - No more than 5 years at a time



# Ambient Air Quality Standard Applicability for Feedlots - Exemption

- Statutory exemption for manure cleanout
  - Exempt while removing manure and for 7 days after manure removal completed
    - Must provide notice to MPCA or County Feedlot Officer
    - For feedlots over 300 animal units maximum number of days is 21 per calendar year
      - 300 head of beef cattle
      - 215 mature dairy cows
      - 1000 finishing swine



# Tools to Evaluate Compliance

- Jerome Meters
  - Used as a screening tool to warrant further investigation
    - Ease of use, hand held, portable
    - Available for many sites
- Continuous Air Monitors (CAM's)
  - Honeywell MDA single point chemcassette
  - Regulatory measurement
  - Deployed for the monitoring season (April – Oct)
    - Select few sites get monitored (typically 4 a year)



# Investigation/Monitoring Site Selection

- Largely complaint driven
  - No mandatory criteria for monitoring
    1. Evaluate complaint validity
    2. Jerome Meter
    3. Establish site priority (informal)
- MPCA staff suggestions
  - New technologies
  - Proximity to sensitive groups/areas
  - Sites similar to previous violators



# Statutory Basis

## 116.0713 LIVESTOCK ODOR.

(a) The Pollution Control Agency must:

- (1) monitor and identify potential livestock facility violations of the state ambient air quality standards for hydrogen sulfide, using a protocol for responding to citizen complaints regarding feedlot odor and its hydrogen sulfide component, including the appropriate use of portable monitoring equipment that enables monitoring staff to follow plumes;



# Monitoring Logistics

- MPCA typically performs initial monitoring
  - Sometimes facility pays/splits costs
    - Part of a settlement agreement, permit condition for use of new technology, etc.
- Additional monitoring or follow-up monitoring after a fix is installed is typically performed by the facility
  - Facility pays the costs
    - May be factored into penalty paid for violations



# Response to Violations

- MPCA enforcement process
  - Can be lengthy
    - Legal challenges, plan revisions, etc.
  - “You created the problem you tell us how you are going to fix it.”
    - No specific BMP’s/technologies required
    - Submittal of plans for mitigation to MPCA
      - Revise if needed
    - Agree to timeline of implementation
    - Follow-up monitoring to verify controls work
      - Typical but not automatic



# Feedlot Permitting/Review

- Permit required for CAFO's, new construction, or sites required to fix pollution hazards
  - NPDES (Federal) / SDS (State Disposal System)
    - Large CAFO's (federal definition) or
    - 1,000+ Animal Units (state definition)
      - 1,000 beef cattle (1.0 AU)
      - 715 mature dairy cows (1.4 AU)
      - 3,334 finishing swine (0.3 AU)
  - Environmental Assessment Worksheets (EAW's)
    - Construction/Expansion of 1000+ AU
    - Evaluate need for an Environmental Impact Statement (EIS)



# Ambient Air Quality and Feedlot Permits

- NPDES/SDS Permits
  - Require submission of Air Emissions Plan (AEP) and incorporated into the Permit
    - Identify measures to be used to mitigate air emissions in the event of an exceedance of the H<sub>2</sub>S standard.
    - Standardized form from MPCA lists BMP's or control technologies that are recommended for use in plan to mitigate exceedances
      - See handout



# Response to Documented Exceedance(s)

(Minn. R. 7020.0505, subp 4.B(1)(b))

Initial here: \_\_\_\_\_,

**by initialing here I indicate that I have read, understand, and agree to the requirements/procedures outlined below.** (initial is required for all facilities using this form)

In the event testing/monitoring conducted by the MPCA/County identify emissions in excess of standards set in applicable Minnesota Rules, Statutes, or other directives, the facility/ownership agrees to submit a plan of action following MPCA's request, which provides technical documentation that one (or more) of the following technologies will effectively control emissions in the short term as well as into the future:

## Liquid Manure Storage Areas

- Chemical additions to the LMSA
- Maintain natural crusting (blow straw to promote crusting if necessary)
- Maintain a straw cover
- Permeable synthetic cover (floating geo-textile, etc.)
- Impermeable synthetic cover (floating HDPE, etc.)
- Anaerobic digester
- Treatment of escaping air with odor control technologies

## Solid Manure Storage Areas

- Cover manure stockpiles with synthetic covers
- Remove manure packs more frequently
- Eliminate stockpiling by more frequent land application
- Incinerate solid manure for electricity
- Composting solid manure

## Animal Holding Areas

- Utilize bio-filters or other odor control technology for power ventilated buildings
- Decrease the amount of manure buildup in the animal holding areas

## Dead Animal Handling/Processing Areas

- Utilize enclosed and refrigerated dead animal holding area prior to rendering pick-up
- Animal mortality composting

The MPCA will, at its discretion, consider alternatives to the technologies listed above provided proper technical documentation is submitted that illustrates the alternative will undoubtedly minimize the emissions. The MPCA reserves the right to disapprove of the alternative if the MPCA deems the technical documentation incomplete or inaccurate or if the MPCA deems the alternative unsuitable for the unique circumstances at the facility.

The plan of action must identify when the technology will be installed and fully operational and should also identify what temporary measures can be taken to minimize emissions in the event the chosen technology will take a significant amount of time to install and make fully operational. The plan of action will be immediately implemented following approval by the MPCA and become part of this air emission and odor management plan and subsequently an enforceable part of the facility's NPDES/SDS Permit.



# Ambient Air Quality and Environmental Review

- Environmental Assessment Worksheets (EAW's)
  - Requires analysis of air emissions with an air emission model by applicant (CALPUFF)
    - Incorporate background concentration to account for potential cumulative air quality impacts
      - 17 ppb H<sub>2</sub>S
      - 148 µg/m<sup>3</sup> NH<sub>3</sub>
    - Predicted emissions at the property boundaries
      - Comply with state standards,
      - Over/under health risk values, and
      - Frequency of faint/moderate odor events.



# Air Emission Modeling without EAW Preparation

- Prohibited by statute for some facilities.
  - Minn Statute 116.0713 - The agency may not require air emission modeling for a type of livestock system that has not had a hydrogen sulfide emission violation.



# Animal Agriculture

## Environmental Impact Statement

- Funded by MN Legislature in 1998 due to continued debate over livestock industry
  - Completed in 2001
  - Extensive study of feedlots
    - Environmental, Economic, & Social
  - Found that modeling was a valid prediction tool
  - Evaluated air emission control technologies
  - Wealth of info
    - <http://www.eqb.state.mn.us/project.html?id=18252>



# Air Quality Influenced Setbacks

- The State of Minnesota does not have setbacks from residences, cities, etc
  - Only setbacks are from water features
- Some Counties in MN have setbacks based on odor modeling tools (OFFSET) or number of animals/manure storage type



# Working with Other Groups

- University of Minnesota
  - Very good dialogue between U and MPCA
    - Rely on U of MN to help evaluate odor control technologies
  - University created OFFSET which counties use to assist with feedlot location issues
- Producer Groups
  - Open dialogue
    - involved groups during development of new general permit
      - Pork Producers, Cattlemen's Assoc, MN Milk, etc.
  - Encourage coop between U and MPCA
    - Decisions/regulations based on science



# Air Quality Case Example - Valadco

- Swine facility built in 1992 - 1993 with large anaerobic lagoons for manure storage
- Started receiving numerous complaints in 1994
  - Performed monitoring and documented exceedances
    - Permeable geo-textile cover installed
- Cover failed (sank)
  - Continued monitoring showed more exceedances
    - Impermeable cover with ozone treatment installed







# Air Quality Case Example - Valadco

- Impermeable cover with ozone not working
  - Continued monitoring showed exceedances
- Purchased around 2002 by another entity
  - Entered into agreement with MPCA
    - Closed largest earthen basin
    - Installed two circular concrete tanks
    - HDPE covers on all manure storages in 2004
- No complaints about odor since



# Effects of Valadco (and others)

- Open Air Basin Moratorium
  - Minn Statute 116.0714 - The MPCA or a county board shall not approve any permits for the construction of new **open air swine** basins, except that existing facilities may use one basin of less than 1,000,000 gallons as part of a permitted waste treatment program for resolving pollution problems.



# Air Quality Case Example – Excel Dairy

- Constructed in 1996
  - Complaints started shortly after opening
  - Ceased operating in 2004
- Purchased in 2005 by current ownership
  - No animals on-site
- September 2006 application for modification
  - 1 new barn & 2 new basins
  - No expansion in AU's (remain at 1544 head)



# Air Quality Case Example – Excel Dairy

- November 2006 inspection
  - Damage to basin 1
    - Require repair and evaluation
  - No animals on-site
  - Approx. 3 ft of waste in basin 1
- March 2007 Individual NPDES/SDS Permit
  - Construction of new barn and basins 2 & 3
  - Repair & evaluation of basin 1
    - By Nov.1 2007



# Air Quality Case Example – Excel Dairy



Basin #1

Basin #2

Basin #3

# Air Quality Case Example – Excel Dairy

- May 2008
  - Begin H<sub>2</sub>S monitoring
  - Excel begins aeration
- June 2008
  - Deputy Commissioner requires straw covers
  - Legal action taken by MPCA and AGO
    - Cover basins with straw as part of air emissions plan
- July 2008
  - Judge issued temporary injunction
    - Straw cover on Basin 1, continue aeration in 2 and 3
  - EPA NOV for Clean Air Act violations



# Air Quality Case Example – Excel Dairy

- September 19, 2008 Facility declared a public health hazard by MDH and ATSDR
- February of 2009
  - Excel removes cows (not manure)
- March 26, 2009 MDH/ATSDR Health consultation
  - Monitored for 3 weeks in July 2008
    - MPCA monitor maxed out at 90 ppb 97 times
    - At residences – over 100 ppb 8 times
    - At residences – over 200 ppb for 1-3 hours 3 times



# Air Quality Case Example – Excel Dairy

- April 28, 2009
  - Revocation and reissuance of NPDES Permit
    - Remove manure by June 12, 2009
    - No cows until all actions are done
    - Straw on basin 1, HDPE on basin 2, geotextile on basin 3
    - One year permit
- July 2, 2009 administrative order
  - Remove manure from basins 2 and 3
    - Removed most of manure by 7-14-09



# Air Quality Case Example – Excel Dairy

- October 1, 2009 administrative order
  - Finish manure removal from all basins
    - Finished basins 2 and 3 in early Dec. 2009
    - Left 7 feet in basin 1
- January 20, 2010
  - Notice of intent to deny re-issuance of Permit
    - Continued non-compliance & bad actor statute
  - Court order to remove manure in basin 1 in spring
    - Down to 2 feet in late April



# Air Quality Case Example – Excel Dairy

- March 2010
  - MPCA Order denying continued operation under the expired permit
  - MPCA Order granting a contested case hearing regarding the denial of re-issuance of the permit
    - Required in bad actor statute
- April 28, 2010
  - Excel's permit expired



# Air Quality Case Example – Excel Dairy

## Air Emissions 2008 & 2009 (Summary)

### Number of Exceedances

H2S Levels	2008	2009
31 – 50 ppb	202	113
51+ ppb	174	96
90 ppb	102	8
<b>Total Exceedances</b>	<b>478</b>	<b>217</b>



# Lessons Learned

- Each Feedlot is different
  - No one size fits all approach
    - Covers most fool-proof
    - Let feedlot play a role in deciding appropriate controls
- Current MN practice can be lengthy
  - Court process is unpredictable
  - Additional emergency powers for public health hazard declarations would be helpful
- Separation distance is the easiest control
- Things get “political” quickly



# Recommendations

- Develop a screening tool
  - Not a full blown air dispersion model
    - Weed out those that clearly will be OK
    - Proactive not reactive
- Incorporate rules/requirements into Permits
  - Incorporated plans must be unambiguous
- Work with research Universities
  - Keep up to date with technologies
    - Decisions based on sound science



# Questions?

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