

 **Minnesota Pollution Control Agency**

*The Minnesota Ambient Hydrogen Sulfide Air Quality Standards and the Livestock Industry:
A brief overview.*



James E. Sullivan
Minnesota Pollution Control Agency
September, 2008

Talk Overview

- Brief History of the Standards
- Relationship to Livestock Air Quality
- Development of the livestock air quality program
- Stakeholder effort
- Current practice

Brief History of the Standards

- Adopted by Minnesota in 1969
- Frequency, concentration and duration values
 - *A Compilation of Selected Air Pollution Emission Control Regulations and Ordinance.*
 - A "how to" manual for developing air quality standards
 - Contained examples from other governmental units
 - Hydrogen sulfide standards derived from the Air Pollution Control Regulation for St. Louis Metropolitan Area (adopted February 22, 1967, by the Missouri Air Conservation Commission and later the State of Missouri)
 - Values reflect measurement technology of the time and odor nuisance

Talk Overview

- The MPCA created a number of ambient air quality standards including hydrogen sulfide
 - Particulate matter (PM10 & TSP)
 - Ozone
 - Metals
- Distinguished between a primary and secondary standard
 - Not for each pollutant

Brief History of the Standards

Minn. R. 7009.0010 Definitions.
Subp. 2. **Primary ambient air quality standards; primary standards.**
"Primary ambient air quality standards" or "primary standards" mean levels established to *protect the public health from adverse effects*. The adverse effects that the standards should protect against include *acute or chronic subjective symptoms and physiological changes that are likely to interfere with normal activity in healthy or sensitive individuals* or to interfere unreasonably with the enjoyment of life or property [Italics added].

Brief History of the Standards

Minn. R. 7009.0010 Definitions.
Subp. 3. **Secondary ambient air quality standards; secondary standards.**
"Secondary ambient air quality standards" or "secondary standards" mean levels established to protect the *public welfare from any known or anticipated* adverse effects, such as injury to agricultural crops and livestock, damage to or deterioration of property, *annoyance and nuisance* of persons, or hazards to air and ground transportation [Italics added].

Brief History of the Standards

- Minn. R. 7009.0080
 - Applies at property boundary or where the public has access
 - Two standards – both applied as primary standard

Minnesota Ambient Hydrogen Sulfide Air Quality Standards		
	Primary Standard	Remarks
Hydrogen Sulfide	0.05 ppm (50 ppb) by volume (70.0 micrograms per cubic meter)	1/2 hour average not to be exceeded over 2 times per year.
	0.03 ppm (30 ppb) by volume (42.0 micrograms per cubic meter)	1/2 hour average not to be exceeded over 2 times in any 5 consecutive days.

Relationship to Livestock Air Quality

- Livestock operations exempt from odor rules
 - MPCA no longer has odor rules
- Livestock operations never exempted from ambient air quality standards
 - Early to mid 1990's – change in livestock production practices
 - Open-air manure storage more common & larger scale
 - Early efforts to manage hydrogen sulfide were ineffective
 - Function of monitoring efforts and funding
- Legislature provided funding in 1996
 - Odor complaints
 - Portable monitors
 - Enforce the state ambient hydrogen sulfide air quality standards

Development of the livestock air quality program

- Initial actions of this effort reflected complaint-based actions
 - 1997 deployed staff with Jerome Meters
 - Developed a continuous air monitoring method
 - Compliance purposes
 - 1998 documented a number of potential problems and some actual violations
 - Enforcement varied from non-binding agreements to formal agreements with penalties
 - All agreements featured some measure of corrective or control actions
 - Air quality issues became an environmental review concern
 - Advent of air quality dispersion modeling for livestock operations

Development of the livestock air quality program



- Arizona Instruments
 - Jerome Meter
 - Portable gold-foil analyzer
 - Easy to use
 - Total reduced sulfur
 - Low-level of detection
 - Not used for compliance
 - Not continuous
 - Grab-sample

Development of the livestock air quality program



- Continuous Air Monitor
 - Zellweger MDA Single-point Monitor
 - Chemically-treated paper tape
 - Compliance method
 - Continuous
 - Easy to transport & set up
 - Kept on location for extended periods of time
 - Requires data-logger & power source
 - Meteorological data
 - Wind speed
 - Wind direction

Development of the livestock air quality program



MDA in the field with solar power source and meteorological equipment.

Development of the livestock air quality program

- Information gaps identified
 - Stakeholder group
- Development of the inhalation health risk values for hydrogen sulfide
 - Minnesota Department of Health
 - Sub-chronic, chronic and acute exposures
- Legislative activities
 - Agitation & pump out
 - Easement
 - Modeling restriction

Stakeholder effort

- Information gap created issues with environmental review
- Litigation an issue
- Too costly for each feedlot to front assessment work
- Developed a stakeholder group
 - University
 - Government
 - Industry
- Collection of monitoring data and modeling
 - Primarily swine
 - Measurement of emissions and concentrations
- Information used to better inform environmental decisions
- Effort discontinued with new administration

Stakeholder effort

- Hydrogen sulfide background concentration developed in part from this work
 - Relevant to environmental review
 - Accounts for offsite emissions (stationary & mobile)
 - Used for cumulative effect analysis
- Process to calculate background concentration
 - EPA method for criteria pollutants
 - Follows the form of the standard
 - Uses monitoring data
- Stakeholder work provided additional monitoring data
- Current background concentration is 17 ppb
 - Excludes outliers and highest highs

Current Practice

- Most complaint response is CAM
- Air quality modeling needed for all livestock environmental review
 - State ambient hydrogen sulfide air standards
 - Inhalation health risk standards
 - Debate on emission factors
 - Improved predictability of process & decision-making
 - MPCA Citizen Board relies upon the information
- NPDES/SDS permit contains air emission and odor management plans

Questions



Jim Sullivan
Minnesota Pollution
Control Agency
Saint Paul, MN
651.296.6300
jim.sullivan@pca.state.mn.us
