

## Practical Thoughts for Manure Handlers



Robert Meinen  
Senior Extension Associate  
Penn State Department of Animal Science  
University Park, PA  
[rim134@psu.edu](mailto:rim134@psu.edu)  
(814) 865-5986




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## Confined Spaces



- Do not enter them!!
- Gases can cause loss of consciousness and death.
- Always assume there are gases present.








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## Open Air Manure Storage Safety

- Non-enclosed manure storages can still meet the definition of a **confined space** in terms of occupational safety and health:
  - Is large enough that a worker can enter and perform work;
  - Has limited or restricted means for entry or exit; and
  - Is not designed for continuous human occupancy



*"Easy in. Hard to get out!"*




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*What is your responsibility?*

Everyone has an obligation to design, supply, buy, operate and maintain manure storage and handling systems that are safe for workers, visitors and **children**.




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**Gases**

- Some are odorless
- Most (all) are colorless
- Some are explosive
- Some sink (e.g. H<sub>2</sub>S)
- Some rise




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**H<sub>2</sub>S**

- Many people can detect it <1 ppm
- Can deaden sense of smell at 100 ppm
- Deadly 600 ppm

Exposure Level	Effect or Symptom
<b>On Humans</b>	
10ppm	Eye irritation
20ppm for more than 20 min.	Irritation to the eyes, nose & throat
50-100ppm	Vomiting, nausea, diarrhea
20ppm for 1 hour	Dizziness, nervous system depression, increased susceptibility to pneumonia
500ppm for 30min	Nausea, excitement, unconsciousness
600ppm +	Rapid death
<b>On Swine</b>	
20ppm, exposed continually	Fear of light, loss of appetite, nervousness
200ppm	Possible pulmonary edema (water in the lungs) with breathing difficulties and possible loss of consciousness and death

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### Invest in the Insurance of a Monitor

Test atmosphere

- Oxygen deficiency
- Combustibles
- Toxic gases



Multiple gas vs single gas— cost and ease of use will be a factor

Own or lease



Most reliable way of "seeing" the invisible



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### Open Air Manure Storage Safety

Safety tips include:

- No horseplay
- No smoking, open flames or sparks
- If equipment malfunctions shut it off and remove it before servicing
- If *feeling unsure or uncomfortable*, step back, contact someone and review the situation before proceeding.
- Be prepared to call 911 if an emergency happens.
  - accurately *describing the incident*, number of victims, and giving specific directions to the site of the emergency.



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### Tips for Operators

- Use a monitor.
- Observe agitation from a distance. Consider remote control kill switches.
- The first hour of agitation is probably the worst, but *never* let your guard down.
- H<sub>2</sub>S is a heavy gas – higher is better.
- Remember health of nearby livestock.
- This is one time when the Agricultural Work Ethic can backfire!

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### *Observed gas behavior*

Gases *'throw'* in the direction of manure agitator nozzle, so be aware of dangerous impact on 'downwind' animal- or human-occupied areas



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### *Operator Position – up and away*

Position operator work area so that a person...

- Does **not** reach over the storage for routine practices
- Does **not** work or need to adjust machinery near storage edge
- Is **not** in a low-lying area. (Remember H<sub>2</sub>S is a heavy, ground-hugging gas)

Choose up-wind position



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### *Gypsum bedding should **not** be used with under-barn manure storage*

Unconditional recommendation **against** under-barn manure storage when gypsum bedding is used.

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New NRCS  
Warning Sign

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*Gypsum and Liquid not needed*

- *All manures are organic material in a state of microbial degradation.*
- *Gases are a by-product of microbial respiration.*

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**Body Alarms!!!**

- Dizziness
- Wobbly knees
- Feeling hot and clammy
- Lack of attention to details
- Loss of motor skills/fatigue
- Anxiety
- Severe eye irritation/decrease in sight
- Irregular/fast heartbeat
- Headaches
- Nausea/Vomiting
- Shortness of breath
- Panting
- Pausing/Stopping of breath
- Respiratory tract irritation/Coughing
- Tightness of chest
- Acute bronchitis
- Asphyxiation
- Loss of consciousness

*Pay attention to your body. Take action if there are signs of gas exposure. Get to fresh air!*

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*Learn More* at the *North American Manure Expo*

- Data collection demonstrations (July 14 Tour Day)
- Highlighted education on manure gas issues




**Chambersburg, PA**  
 - **Tour Day** - July 14  
 - **Main Event** - July 15

[manureexpo.org](http://manureexpo.org)

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*Manure Gas Risks Associated with Gypsum Bedding at Dairy Farms*

**Penn State Investigators**

- Eileen Fabian-Wheeler, Mike Hile, Davis Hill, Dennis Murphy, Robin Brandt, Hershel Elliot, Mike Platek, Robert Meinen

*Acknowledgment and Thank You to the supporters of this project.*

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[www.manurepitsafety.psu.edu](http://www.manurepitsafety.psu.edu)

**Video Presentations:**

- Reducing Entry Risk: Solid Floor Storages
- Reducing Entry Risk: Slotted Floor Storages

**Fact Sheets:**

- E 51: Confined Space Manure Storage Hazards
- E 52: Confined Space Manure Gas Monitoring
- E 53: Confined Space Manure Storage Ventilation System Design
- E 54: Confined Space Manure Storage Emergencies
- Open Air Manure Storage Safety Tips

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More information on issues surrounding handling manure with gypsum bedding

- Agricultural Safety web site  
– [extension.psu.edu/business/ag-safety](http://extension.psu.edu/business/ag-safety)
- Gypsum bedding and manure handling  
– [abe.psu.edu/news/2014/gypsum-bedding...is-it-worth-the-risk](http://abe.psu.edu/news/2014/gypsum-bedding...is-it-worth-the-risk)
- Commercial Manure Hauler and Broker Certification Program  
– [www.agriculture.state.pa.us](http://www.agriculture.state.pa.us)
- North American Manure Expo  
– [manureexpo.org](http://manureexpo.org)

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**Thank you!**

Come see us at Waste to Worth

- Mike Hile will present this information at the Poster Session

**QUESTIONS?**



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