1982

Safety Precautions with Liquid Manure Storage Systems: Warning--Manure Gases Can Be Dangerous

Larry R. Piercy
University of Kentucky

Joseph L. Taraba
University of Kentucky

UNIVERSITY OF KENTUCKY
COLLEGE OF AGRICULTURE
Lexington, Kentucky 40546

COOPERATIVE EXTENSION SERVICE

Agricultural Engineering Update


Structures & Environment


Soil & Water


Energy


Safety


Crop Processing


Power & Machinery

AEU-7

SAFETY PRECAUTIONS WITH LIQUID MANURE STORAGE SYSTEMS
WARNING - MANURE GASES CAN BE DANGEROUS

Larry R. Piercy and Joseph L. Taraba
Extension Specialists for Agricultural Engineering

A liquid manure system produces 4 gases which are potentially hazardous to workers and animals. The decomposing manure slowly releases these gases into the liquid and the surrounding atmosphere. During agitation of the manure large quantities of gas are released into the air. Tragic human deaths and animal losses have occurred during agitation or from humans entering the pit areas.

DESCRIPTION OF MAJOR MANURE GASES

Hydrogen Sulfide	- Rotten egg	- Heavier than air and settles in pit	- Very toxic gas causing headaches, dizziness, nausia. Sudden unconsciousness and death occur at higher concentrations.
Carbon Dioxide	- No odor	- Heavier than air and settles in pit	- High concentrations can cause drowsiness and headaches. Large quantities may be released during agitation and result in displacement of oxygen and lead to asphyxiation.
Ammonia	- Pungent odor	- Lighter than air and rises	- Causes irritation of eyes and nose forcing evacuation of the area before fatal levels are reached.
Methane	- No odor	- Ligher than air and rises	- Primarily an explosion hazard where gas collects in stagnant pockets. Can cause asphyxiation.

SAFETY PRECAUTIONS

1. Use maximum building ventilation rates during agitation of manure in underfloor pits. Keep workers out of the area and remove animals or observe closely and stop agitation at the first signs of trouble.

2. Avoid entry into a manure pit or sump unless absolutely necessary. Hazardous levels of manure gases may be present at any time but especially during and after even minor agitation. The following precautions should be taken before entry:

   a. If possible ventilate the pit area prior to and during entry. This will reduce the concentration of gases but will not necessarily eliminate the problem.

   b. Only two methods can assure a worker of a safe air supply for entering a liquid manure storage area: by wearing a self-contained breathing apparatus such as worn by fireman or checking the air with gas dectection devices prior to entry to insure an adequate oxygen supply and safe levels of the hazardous manure gases. (CAUTION: Both of these require the use of specialized equipment that needs training in proper use and regular maintenance to keep it in good working order.)

   c. Any person entering a potentially hazardous area should have a backup rescue system such as a body type safety harness and rope with at least two individuals outside who are capable of lifting the individual from the area. (This includes a person entering a pit with a self-contained breathing apparatus.)

3. Never attempt emergency rescue of a human or animal overcome by manure gases unless self-contained breathing apparatus is available.

4. Maintain minimum ventilation rates in confinement buildings with underfloor manure pits to prevent buildup of gases during normal operation.

5. For protection from slips and falls into the pit provide proper covers, guardrails or fencing for all floor openings into the pit, except in the area of utilization during use. When possible provide grates with one dimension less than 12" on push-off openings to prevent worker from falling through openings.

6. Erect barriers on all push-off platforms and piers strong enough to stop a tractor from entering the pit.

7. Be alert to open dairy and beef lagoons which may develop a crust that appears solid enough to walk on. Surround all open basins and lagoons with fences to keep children and visitors out.

8. Post warning signs at pit entrances, on fences around lagoons, etc. to alert and warn others of the dangers.

FOR MORE INFORMATION ON THE HAZARDS AND SAFE MANAGEMENT PRACTICES ASSOCIATED WITH ANIMAL WASTE SYSTEMS, SEE YOUR COUNTY EXTENSION AGENT FOR THE BULLETIN AEN-52, "SAFE USE OF ANIMAL WASTE MANAGEMENT SYSTEMS."