

Factsheet: Safe Manure Removal Policies

The process of removing manure from below-building storage of swine facilities is a task that requires careful attention to ensure the utmost safety for humans and pigs. Knowing what to expect when handling manure and following recommended removal guidelines can help make this chore safe.

Follow basic steps for improved safety.

- ✓ **Remove all workers from buildings before beginning manure agitation.** Never enter a building or allow workers to remain in buildings or manure storage when agitating manure.
- ✓ **Place warning signs at all entrances to buildings and manure-storage areas where manure agitation is taking place so people will not enter.** Warning tags (shown at right) can be ordered at no charge from the Pork Store on the Checkoff Web site at www.porkstore.pork.org/producer and click on pork production resources, then pork safety.
- ✓ **Remove all animals from buildings before beginning manure agitation, if possible.**
- ✓ **If removing animals is not possible, begin agitating manure slowly and gradually increase pump speed while observing animals from outside the building.** If signs of animal stress are noted, immediately discontinue agitating the manure.
- ✓ **Do not enter the building until complete ventilation of the building has occurred – at least 30 minutes** while maintaining full ventilation – or unless wearing a properly fitting self-contained breathing unit that you are trained to use.
- ✓ **Never enter a building or manure storage to rescue a distressed animal or person without wearing a properly fitting self-contained breathing unit** that you are trained to use.



- ✓ **Never enter a manure storage pit or tank unless it is absolutely necessary,** and then only if it is well-ventilated and you are wearing a properly fitting self-contained breathing unit that you are trained to use, wearing a properly fitted harness and lifeline and having at least two other people to rescue you in the event of a problem.
- ✓ **For manure-storage access points, at or below ground-level, install covers or grates in such a way that people or pigs cannot fall into the manure pit/storage.**

Proper ventilation is a key safety factor

The greatest manure-related hazard exists almost immediately after vigorous agitation of manure begins due to manure-related gases, but the danger may continue even when there is full ventilation. Follow these guidelines to help avoid unnecessary risks.

- Prior to agitation or pumping, turn off electrical power to any non-ventilation equipment and extinguish any pilot lights or other ignition sources in the building.
- Don't begin agitating stored manure until a sufficient amount of time has passed prior to starting agitation to ensure adequate air movement and exchange.
- For mechanically ventilated buildings, provide the maximum mechanical ventilation possible – all fans in operation prior to beginning and throughout agitation of manure.
- For naturally ventilated buildings, agitate manure only with all side curtains and building openings fully open and when there is a brisk breeze.
- When pumping pits that are close to full, pump without agitation until manure is two feet below the bottom of the floor slats to allow pit fans to perform properly during agitation.
- When agitating manure, keep the jet of pressurized manure below the liquid surface. Do not allow it to strike walls or columns in the pit. Stop agitating when the manure level does not allow agitation below the surface.

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Know and respect manure-related gases.

Anyone working around manure should be knowledgeable about the naturally occurring gases that occur in stored manure. Any agitation of liquid manure stored for more than a few weeks will release levels of gases that can be toxic, flammable and potentially lethal. The five main gases of concern are:

- 1. Hydrogen sulfide gas** is released during decomposition and agitation of manure. It is a flammable, poisonous gas that smells like rotten eggs. Hydrogen sulfide is extremely dangerous. If exposed to concentrations of 10 ppm, humans may experience severely irritated eyes, throat and lungs. As the concentration increases (50 to 100 ppm), humans may vomit and suffer from diarrhea. Concentrations above 600 ppm can cause immediate loss of consciousness and death. If animals are constantly exposed to low levels of hydrogen sulfide, it will cause them to become fearful of light, nervous and lose their appetite.
- 2. Methane** is released during decomposition and agitation of manure. It is colorless, odorless and is usually a nontoxic gas. The danger methane poses to humans and animals is when it gathers in amounts large enough to cause oxygen levels to decrease. Explosion is the key risk with methane.
- 3. Ammonia**, another gas released in hog operations, also is released during the decomposition and agitation of manure. Ammonia is a pungent, colorless, noxious gas, easily detected even in small concentrations and can cause respiratory irritation. Over-exposure to ammonia, even in extremely low concentrations, can be detected

and identified. In humans, low levels of ammonia can irritate the eyes, throat and lungs. Concentrations of ammonia as low as one-half of 1 percent (5,000 ppm) can cause suffocation in humans. For hogs, ammonia concentrations at non-lethal levels can cause symptoms such as sneezing, increased salivation and loss of appetite. Chronic exposure can result in increased susceptibility to respiratory diseases.



- 4. Carbon monoxide** is released from unvented heaters and gas-powered power washers. Carbon monoxide is hard to detect because it is both colorless and odorless. Carbon monoxide is an extremely toxic gas and can kill humans exposed to high concentrations.
- 5. Carbon dioxide** is released during the respiration of animals. It is a heavy, colorless gas that can cause respiratory rates to increase at high levels. Humans will generally have no reactions at low levels. Concentrations of 1 percent (10,000 ppm) may make some people drowsy. Concentrations of 6 percent (60,000 ppm) to 10 percent (100,000 ppm) will cause dizziness, headache, visual and hearing dysfunction and unconsciousness within a few minutes to an hour. In animals, a 4 percent (40,000 ppm) concentration would cause a noticeable increase in respiration rate and could lead to death.



For additional information on safety practices visit the Worker Safety pages located on the Pork Checkoff web site at www.pork.org/PorkScience/WorkerSafety.

For information on ways to control emissions visit the Pork Checkoff funded Air Management Practices Assessment Tool at www.extension.iastate.edu/airquality/practices/homepage.html.