West Virginia University
Extension Service

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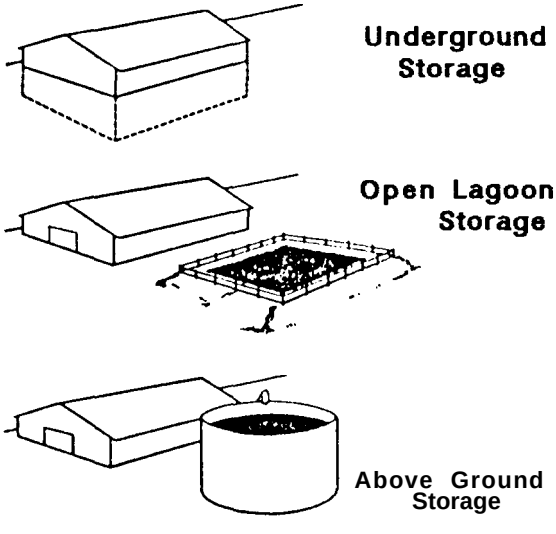
Agricultural Engineering

Livestock Safety – Manure Handling and Storage

The use of large capacity, on-farm, liquid manure storage facilities has become a common practice in recent years. These include tanks located directly underneath the livestock housing area, storage located away from the livestock housing area in open lagoons or ponds, and above ground silo-type storage tanks. While this practice has greatly increased the efficiency of manure handling, it has also introduced many potential hazards. Of these three types, underground storage is the most hazardous.



Safety Hazards

When animal waste of any type is being stored in large volumes, a number of hazards exist for both the animals and the handler.

The most obvious is the potential danger of drowning. There is also the danger from gases which are produced as the manure is decomposed by bacterial action. This includes gases that are toxic (ammonia), corrosive (hydrogen sulfide), asphyxiant (carbon dioxide), and explosive (methane). Anyone working around animals should be aware of the physical effects of these various gases released during manure decomposition so that a hazardous situation can be recognized immediately.

Designing a Safe Manure Storage Facility

Many safety hazards can be avoided by careful planning when designing or reconstructing a manure handling facility.

The most important consideration when building a manure storage facility is keeping storage volume to a minimum. Also, dividing pits into smaller sections will reduce the amount of agitation necessary.

Pump-out openings for manure pits should be located outside of buildings, and access points should be covered by a heavy cover or gate. These covers should be kept in place at all times. Gas traps should be used in pipelines emptying into outside storages to keep gases from flowing back into the buildings.

Guardrails, 42” high, should be built for any walkways on piers or walls surrounding open storage structures. A mid-rail and toe boards should be installed which will help prevent animals on the pier from rolling into the pit if they slip. Piers and push-off platforms should have a barrier strong enough to stop a slow-moving tractor.

Uncovered storages at ground level, such as manure ponds and lagoons, should be fenced in to prevent access by children or livestock. Reflective tape can be used on posts and fencing to increase their visibility at night.

Finally, permanent ladders should be constructed on both the inside and outside of above ground storage tanks. Permanent ladders on the outside of above ground tanks should terminate above the reach of people, or they should have locked entry guards. Permanent ladders should be built on the inside wall of all manure pits and tanks even if they are covered, and these ladders should be constructed of a noncorrosive material.

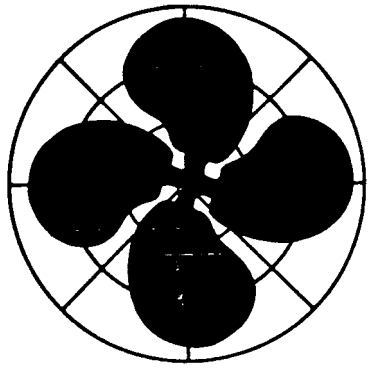
Operating a Safe Manure Storage Facility

Many safety hazards can also be eliminated by following safe operating procedures. The number one way of reducing safety hazards is to never work alone when agitating or emptying a manure storage facility.

The second important factor in operating a safe manure storage facility is maintaining adequate ventilation in all confined areas where livestock are housed and wastes are stored, especially during agitation and emptying.

People and animals should be kept out of the buildings during these times if possible. Ventilation should continue for several hours after pumping has stopped.

Ventilation systems should be equipped with alarms to warn of failure, and auxillary ventilation should be available in case of a



power failure. If the power does fail, open all windows and doors, and remove all livestock and people from the area.

Another means of preventing safety hazards is to never fill a storage facility to capacity. One to two feet of air space should remain between the highest manure level and the slats in the floor above it to accommodate a concentration of gases. If possible, lower the level of liquid manure before starting agitation to decrease the possibility of gas being forced above floor level.

To maintain a safer storage facility, all sources of entry into a liquid manure system, such as lids, gates, hatch covers, and safety grills, should be secured when left unattended. Heavy slide-in-place covers can be moved by livestock if not properly secured. Temporary access ladders should not be left leaning against above ground tanks.

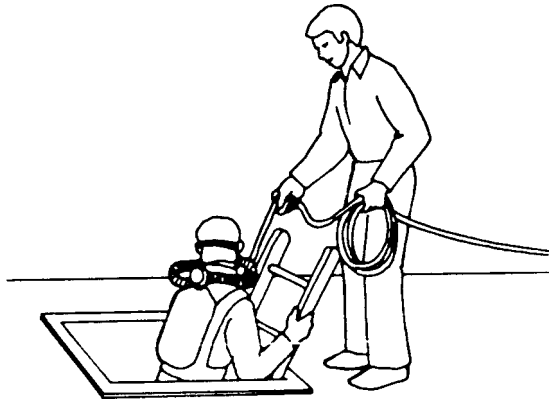
Smoking, open flames, or spark-producing operations, such as welding or the use of saws, drills, or shop vacs, should be forbidden in the vicinity of the storage area to prevent a methane explosion. Electric motors,

fixtures, and wiring near manure storage areas should be maintained in good condition.

Do not allow children or animals to walk on the crust-like surface of open-air storages. This crust is not uniformly solid, and could break through suddenly. Warning signs should be placed near open storages and above ground tanks, and a rescue pole and rope should be kept nearby.

Avoid entering a manure pit if possible. Even if a pit has been emptied, it may still contain high concentrations of toxic gases, or there may not be enough oxygen present to support life. In an emergency situation, the best thing to do is ventilate the area and call for rescue personnel with the proper equipment. Never enter a manure pit to retrieve an unconscious person without wearing self-contained breathing equipment and a harness with a lifeline attached.

Take the time right now to review your manure management system from a safety



standpoint. Ask yourself if there are any dangerous areas in the collection, storage, or disposal phases of your operation. If there are, make them safe today. It could be your life you save.

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