

OPERATION AND MAINTENANCE PLAN
FOR
WASTE STORAGE STRUCTURE

Landowner/user: _____ Date: _____

Address: _____

A properly operated and maintained waste storage structure is an asset to your property. The structure will provide _____ days of waste storage for your operation based on _____ animal units (_____ cows and _____ youngstock). The storage volume (does) (does not) include _____ gallons of milkhouse and/or milking parlor effluent per day.

A well operated and maintained storage structure can meet a number of objectives for the farm operation including improved economy through waste utilization and handling, protection of water quality and added convenience. Caution should be used when working around these structures because they often introduce safety hazards.

This practice will require you to perform periodic operation and maintenance to maintain satisfactory performance. The following pages provide some recommendations to help you develop a good operation and maintenance program. By developing and carrying out a good operation and maintenance program you will realize the most from your storage structure while protecting water quality and reducing potential safety hazards.

OPERATION

Filling the Storage Structure

Avoid frozen manure, wads of straw and hay and other bulky materials such as sticks, stones, wire, twine, etc. when filling the structure by means of piston pumps or gravity load systems. Addition of water may be necessary to make the waste pumpable. Consider using milkhouse effluent for this purpose.

Avoid wire, twine and other materials which can bind the chopper when filling with a chopper pump. Add water as necessary to improve consistency.

Consistency of the waste may vary with bedding quantity and rations fed to the animals. Be prepared to adjust water added.

Do not load toxic substances into the storage structure.

When to Store

The critical periods for storage are generally:

1. Winter, as required by Vermont Accepted Agricultural Practices (AAP's).
2. Midsummer, when fields are unavailable for spreading manure because of growing crops.
3. Spring, summer or fall, when the fields are very wet or flooded.

When to Empty

The storage structure should be emptied at the time specified, preferably when the waste applied to the fields will result in maximum utilization by the soil and growing crops; and, when spreading will result in minimum water quality problems. As a minimum, the structure should be emptied during the late fall prior to the soil freezing; and, in the spring prior to planting. Follow the nutrient management plan prepared jointly with you for periods to spread and incorporate wastes. Manure can only be applied to fields in accordance to Vermont Accepted Agricultural Practices (AAP's).

Agitation

Agitate from each access to the facility. Agitate long enough to break up the crust and to carry all solids into suspension. If the tank is beneath a confined building, make certain that livestock are removed from the building before agitation or that the building is well ventilated, as a high concentration of noxious gases will develop. NEVER enter a holding tank or reception pit unless absolutely necessary; and, NEVER enter a holding tank or reception pit alone. If necessary to enter to make repairs, others should be present outside the structure with means to remove the victim if overcome by dangerous gases. Persons entering tanks should wear self-contained, oxygen supplied breathing equipment and have one end of a rope secured around their body, just below the arms, with the other end secured outside the structure. REMEMBER HYDROGEN SULFIDE PARALYZES THE DIAPHRAGM AND THE VICTIM WILL NOT START BREATHING AGAIN WITHOUT ARTIFICIAL RESPIRATION, EVEN AFTER BEING REMOVED FROM THE NOXIOUS GAS.

All operators should familiarize themselves with gas problems, special wiring needs and ventilation needs. "No Smoking" and other appropriate signs should be posted to warn persons of the danger. Tractors engaged in long periods of agitation may develop oil pressure and engine temperature problems. Be sure that proper lubrication and cooling is provided while agitating equipment operates on an incline.

Unloading

Unloading with conventional equipment is not normally a problem unless excessive amounts of rainfall has accumulated in the structure. If this is the case, the operator needs to pump the liquid into a spreader and take it to the field or pump it directly to the field by means of irrigation equipment in accordance to the nutrient management plan. Under no circumstances should the gate be opened until sufficient liquid has been removed from the structure as to eliminate the possibility of a spill. Most methods of slurry loading of spreaders are rapid. The operator must develop a procedure to avoid overtopping and loss of wastes where they will cause additional work and/or pollute water.

Gravity Unload Systems

The potential of accidental discharge of manure from a gravity unload system is very high. The utmost care and caution must be used in the operation of these systems to prevent accidental discharge. Gravity unload systems are designed with backup shut off valves in the event the primary shut off fails. These systems must NEVER be operated at full capacity because of the dangers from water hammer damaging the system components. All operators of these systems should be trained in their use. All valves shall be closed at all times except when unloading. All valves shall only be opened enough to allow a substantial discharge of manure. Do not open valves wide open while storage is full. Automatic mechanisms to operate valves shall be disconnected between manure applications (ie. over night, lunch time, etc.). If the valves are opened and manure does not flow, close valves immediately and unload storage facility by other means. Before unloading, the manure shall be thoroughly agitated to prevent the build up of solid manure in the pipe and on the bottom of the storage and allow a more fluid discharge of manure from the pipe.

Inspection and Maintenance

1. Check backfill areas around structures often for excessive settlement. Determine if the settlement is caused by consolidation, piping or failure of the structure walls or floor. Necessary repairs must be made. Refer to safety items.
2. Check walls and floor often for cracks and/or separations and make needed repairs. Check a minimum of two times a year when the structure is empty. Refer to safety items.
3. Outlets of foundation drains should be checked frequently and kept open. The outflow from these drains should be checked when the storage structure is being used to determine if there is leakage from the structure into these drains. Leakage may be detected by the color and smell of the outflowing liquid, by lush dark green growth of vegetation around the outlet, by the growth of algae in the surface ditch or by the vegetation being killed by the outflowing liquid. If leakage is detected, repairs should be planned and made to prevent the possible contamination of groundwater. Refer to safety items when planning and making repairs.

4. Fences should be installed and maintained in order to exclude unauthorized entry by people or livestock.
5. Check the channels and berms of the clean water diversions around the barnyard, buildings and storage structure frequently. Channels must be protected from erosion and berms must be maintained at proper height so the diversion channels have adequate capacity. These channels and berms should not be used as haul roads unless they were designed and constructed as haul roads.
6. Check frequently for burrowing animals around buildings, structures, berms and backfill. Remove them and repair any damage.
7. Inspect haul roads and approaches to and from the storage structure frequently to determine the need for stone, gravel or other stabilizing material.
8. Do not allow runoff from loading areas and/or spills to flow into streams or road ditches.
9. Examine and repair as needed, all warning and hazard signs.
10. Install and maintain a marking or gauge post that clearly shows the design one-half and full levels of the structure.
11. The valve mechanisms for gravity unload systems shall be exercised and lubricated frequently. The components of the gravity unload system which are exposed to view shall be inspected frequently for corrosion and for separation and/or movements of parts. Gravity flow unloading systems which are abandoned or not used any more shall be properly removed to eliminate the potential of accidental discharge of manure due to the corrosion and deterioration of the components. If excessive discharge of manure is observed around the pipe or through the valve mechanisms while closed, the manure storage shall be unloaded immediately by other means so repairs can be made. If possible, the unloading pipe shall be flushed of all manure when storage is empty. Any solid manure built up around the entrance of the pipe be removed. Never enter the pipe for any reason!

Safety

1. Waste storage structures must be considered "High Hazard Areas". The biodegradation of waste forms noxious gases such as methane(CH₄), Hydrogen sulfide(H₂S), ammonia(NH₃), and carbon dioxide(CO₂). Which can be fatal to both animals and human beings.
2. Some of these gases can be explosive with the proper gas to air ratio. Use caution with open flames, welding torches and arcs, electrical motors with brushes that spark (skillsaws, electric drills, shop vacs, etc.) when working near waste storage structures. Be sure the work area is well ventilated.

3. Agitation of liquid manure can release large volumes of these noxious gases. Special care must be taken to provide adequate ventilation during agitation and emptying of the storage structure. If there is a question regarding the adequacy of ventilation, the livestock should be evacuated from the building and the operator should wear an oxygen mask.
4. Operators should avoid working alone during agitating and emptying the structure.
5. A reception pit, tank or other storage structure that has contained liquid/slurry manure should not be entered because gases may remain in the structure. When it is necessary for someone to enter one of the structures for repairs, the following precautions must be taken:
 - a. The reception pit shall be ventilated by the use of fans, blowers, etc.
 - b. There should be at least two people; one to remain on the outside and one to enter the structure.
 - c. The one entering the structure must have a safety line attached so that the "outside" man can pull him to safety without entering the structure.
 - c. The one entering must have an air mask which furnishes outside air through an air line and compressor, scuba equipment with air tanks or other means of positively furnished outside air.
 - d. Gas masks must not be used because they operate on the principle of chemically removing unwanted gases from air so the wearer can breathe safely. In manure structures, the air has been displaced by the noxious gases and when the gases are removed by the gas mask, the wearer will suffocate because there is no air for him to breathe.
6. All lids, gates, hatch covers and safety grates to prevent unauthorized entry by people or livestock must be securely in place when tanks and pit openings are left unattended. It has been reported that heavy slide-in-place covers have been moved by livestock.
7. Never leave a ladder that stands against an above ground waste storage structure unattended.
8. All waste storage structures must be posted with signs with the following or similar warning:

DANGER - KEEP OUT

THIS IS A WASTE STORAGE STRUCTURE AND PROLONGED

EXPOSURE MAY BE HAZARDOUS TO YOUR HEALTH.

Future Wells

When installing new wells, springs or other potable water sources, due consideration must be given to the distance, grade and location of the waste storage structure to the new water source. The Department of Health, Department of Agriculture and/or Natural Resources Conservation Service should be consulted as to installing new potable water supplies in relation to the waste storage structure.

Specific Recommendations for Your Structure
