

## Overall Monitoring Activities

Certain activities are advisable and necessary in maintaining a manure storage structure and ensuring that it is performing as expected. Some of these activities may be required by regulation, but all are evidence of good management and stewardship regardless of regulatory requirements.

### Monitoring during pumping activities

Experience has shown that unplanned discharges and spills sometimes occur with pumping activities. Sources of such unplanned discharges include burst or ruptured piping, leaking joints, operation of loading pumps past the full point of hauling equipment, and other factors. Hence, pumping activities should be closely monitored, especially in the “start-up” phase, to ensure that no spills or discharges occur. Continuous pumping systems such as drag-hose or irrigation systems can be equipped with automatic shut-off devices (which usually sense pressure) to minimize risk of discharge in the event of pipe failure.

### Periodic inspections and checklists

A manure storage facility should be inspected periodically to ensure that any potential problems are detected before environmental impacts occur. The frequency of inspections may vary, but a regular inspection schedule should be developed and followed for each system. Inspection frequency might depend on such factors as system size, system complexity, mechanical devices (recycle pumps, float switches in reception pits), flow rate of recycle system, proximity to a sensitive water source, and type of storage facility. Checklists offer a means of ensuring that all items are inspected and noting when they were inspected. They also are evidence of environmental stewardship and may be useful in the event of litigation.

An example checklist for manure storage facilities is included in Appendix B at the end of this lesson.

### Liners

Liners in earthen manure storage impoundments are designed and constructed to provide an adequate barrier between the potential contaminants in the impoundment and groundwater. Hence, liner integrity is extremely important in maintaining an environmentally sound manure storage facility. To the extent possible, liners should be regularly inspected for signs of damage, erosion, or other compromising factors. Wave action can cause liner erosion at the level of the liquid in the impoundment. If this condition is severe, consideration might be given to the use of riprap or similar mitigation methods to preserve liner integrity. The area around the pipes that discharge into the impoundment is also subject to erosion, especially if the pipes discharge directly onto the liner surface. A better configuration is to install inlet pipes such that they discharge into at least 4 ft of liquid, which may require a supporting structure for the end of the pipe. Concrete or rock chutes should be used with inlet pipes that discharge onto the liner surface. Agitation is also an activity that can damage liners. Care should be taken to operate agitators a sufficient distance above the liner so that liquid velocities are reduced enough to ensure that erosion does not occur. Heavy or unusual rainfall events can also erode liners, and special attention should be given to liner inspection after such storm events.

**U**sed regularly, inspection checklists provide a convenient method of detecting potential problems before they occur.

**L**iners are critical in earthen impoundments and should be protected to ensure that the required permeability rate is maintained.

**G**ood records are evidence of stewardship on the part of the manager and operator of a manure-handling system.

**P**roperly installed pumpdown markers are a critical management tool for earthen manure storage impoundments.

### Logbooks and recordkeeping

Certain data and recordkeeping involving manure storage structures can aid in overall maintenance and management, and is also evidence of responsible operation and good recordkeeping. In addition to the periodic inspections, manure levels in a storage structure should be monitored and recorded. This data can illustrate the effects of excessive rainfall and lot runoff, and help in planning pumpdown or other land application activities. Manure levels should be observed and recorded frequently enough to provide a “feel” for the rate of accumulation, and pumping activities should be scheduled accordingly.

When a lagoon is pumped or other manure storage structure is emptied, the date of the activity should be recorded along with the volume or amount of manure removed, locations where the manure is spread, and the nutrient content (lab analysis) of the manure. This information may be required by the regulatory agency for interim or year-end reports, or may be useful in the event of litigation.

### Pumpdown or manure-level markers

Pumpdown or manure-level markers, or indicators, are a simple but important component of a manure storage facility. Such a marker enables the operator to ascertain quickly and easily the degree of fill of the manure storage facility, the point at which pumping or emptying should begin, and the point at which it should end. The presence of a durable, easily read marker gives inspection or regulatory personnel confidence that a manure storage facility is being managed properly.

Experience has shown that pumpdown markers must be made of durable materials and properly installed to afford the long life needed. The operator or inspector should be able to ascertain the following information when observing a pumpdown marker:

- When pumping operations should begin and end
- Level at which overflow will occur
- Fraction of total storage that is currently filled

A common practice is to install steel fence posts at the upper and lower pumpdown levels for earthen impoundments. While this approach provides basic information on beginning and ending pumpdown, experience has shown that more knowledge is needed. Also, fence posts installed in this manner are subject to damage and displacement. A good pumpdown marker will indicate the level, or elevation, of manure throughout the possible range (from lower pumpdown level to overflow, or spillway) in the storage facility. Experience has shown that a 6 inch by 6 inch treated wood pole properly imbedded makes a good pumpdown marker. Notches or other indicators can be carved into the pole to show pertinent elevations. Painted numbers or colors on the pole are not durable enough to maintain readability over a number of years. Figure 24-1 shows a type of pumpdown marker that provides the information needed.

### Weather stations

A simple weather station that indicates or records rainfall can be a useful tool in maintaining and managing a manure storage structure. Rainfall has a significant impact on open storage structures and structures serving open lots, so knowledge of rainfall amounts can be very useful. Some permits are

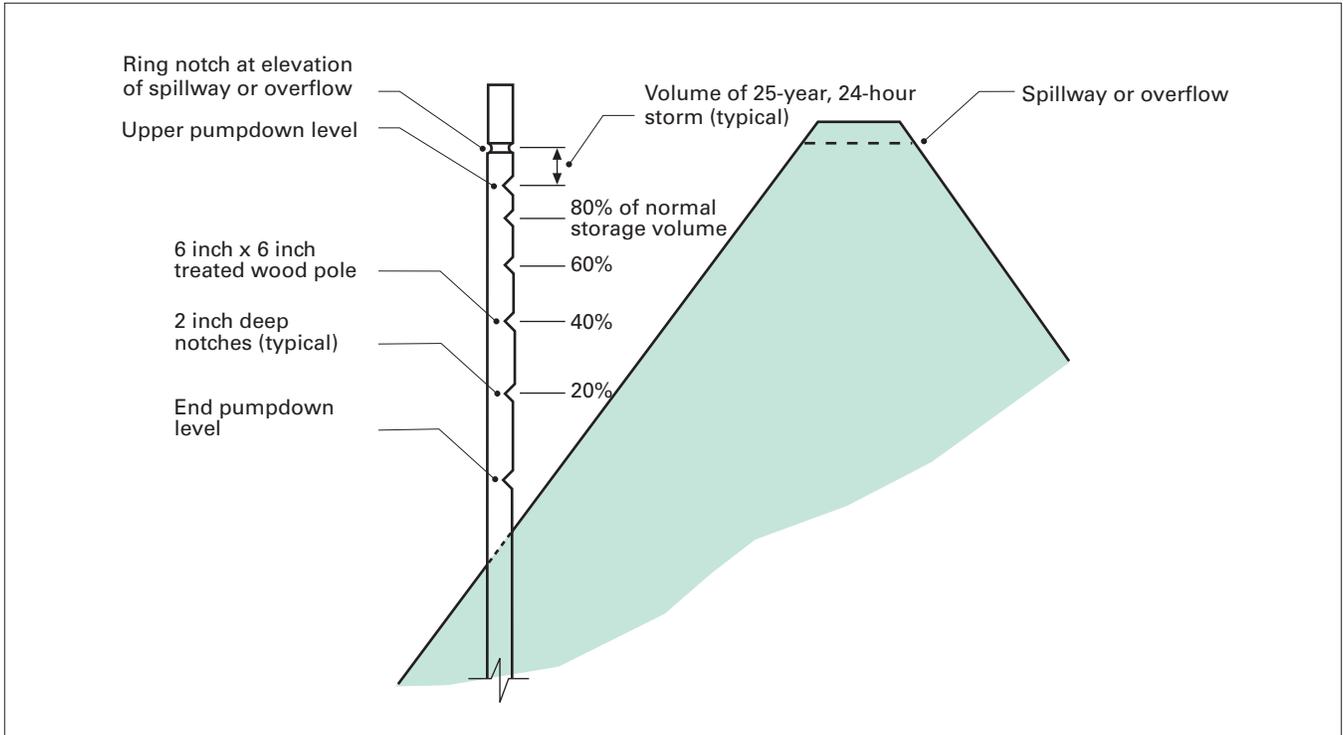


Figure 24-1. Pumpdown marker in earthen impoundment.

written that provide for a “legal” discharge under certain climatic events. A weather station can aid in the documentation of such events without resorting to “off-site” data from stations that may not be descriptive of conditions at the storage facility. Recorded rainfall data is also evidence of good stewardship.