



AEM Tier 2 Worksheet

Manure and Fertilizer Storage

Glossary

Cathodic Protection: Corrosion protection for a metal tank or pipe made possible by a continuous electric current flowing from one or more electrodes or a sacrificial anode to the protected structure.

Emergency Action Plan: A farm-specific response plan for manure/fertilizer storage, transport, and application spills. It includes response protocols, emergency numbers, available equipment, employee training, and other information necessary for effective spill response.

Freeboard: The distance from the maximum operating level of manure to the top of the storage structure.

Staff gauge: A measuring device for quick visual measurements of surface level.

Temporary Manure Pile: A specific location identified and used by farms without storage facilities to pile manure when field spreading is not appropriate or possible.

Vegetated Flow Distance: The length runoff water can flow over a vegetated surface to a waterbody, excluding any length water flows over a non-vegetated surface.

25 year, 24 hour storm: The amount of rainfall in a 24-hour period with a probable recurrence interval of once in 25 years. See Northeast Regional Climate Center for amounts - <http://www.nrcc.cornell.edu/pptext/isomaps.html>

Background

Properly designed and constructed manure storage facilities can minimize risks associated with stored manure and manure applications. Properly sized storage allows flexibility in land application to maximize crop utilization of nutrients and minimize applications at times of high losses. However, the risk of pollution to ground and surface water increases if the storage is improperly-designed, constructed or managed facility.

Likewise, properly stored fertilizers pose little threat to the environment. However, fertilizers that are not properly stored can quickly contaminate water resources, particularly groundwater. If allowed to enter drinking water sources, high levels of nitrates from fertilizers can cause health risks to both humans and animals. Although short-term storage is common, risks can be reduced by limiting the quantity and duration of fertilizer storage on the farm.

Storage and application of nutrients requires a critical balance to meet crop needs and minimize the risk to the environment. Properly designed storage facilities provide the farmer with the flexibility to retain nutrients until weather and crop needs are most favorable for application.

AEM Principle

Manure and fertilizer storage should be designed, constructed and managed so as to protect surface and groundwater resources.

| AEM Tier 2 Worksheet: Manure and Fertilizer Storage Table 1: Manure Storage | | Potential Concern | | |
|---|---|--------------------------|--|--|
| Factors Needing Assessment | Lower 1 | 2 | 3 | Higher 4 |
| Does your farm store manure? | | | | |
| How many months of manure storage capacity does your farm have (including temporary manure piles)? | | | | |
| Has your manure storage system been certified by a professional engineer? If yes, when was it certified? Are as-built plans on file? | | | | |
| What is the approximate distance from and relative location of the storage facility to water wells or springs? | | | | |
| Is the manure storage located in a floodplain? | | | | |
| Have your wells or springs tested high for nitrates (greater than 10ppm)? | | | | |
| Does your manure storage have a staff gauge? | | | | |
| How is freeboard managed? | Freeboard is maintained as per design AND Suitable additional freeboard is maintained for the 25 year, 24 hour rainfall. | | Freeboard is normally maintained but occasionally field conditions require temporary infringement into the freeboard area. | No free board of any kind is maintained. Evidence of overtopping is present. |

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|---|---|---|---|--|
| Factors Needing Assessment | Lower 1 | 2 | 3 | Higher 4 |
| How is manure storage operated and maintained? | Berms on earthen storages are mowed yearly, metal storages have required maintenance of cathodic protection, concrete systems are free of any visible defects and perimeter drains are monitored regularly. Inspection records are available. | | | Berms on earthen storages are not mowed, contains woody vegetation and/or rodent damage; OR Metal storage show signs of rust, and concrete storages show signs of decay. |
| Does your manure storage receive silage juice and milking center waste? | | | | |
| Does human waste enter the manure storage unit? | | | | |
| Is your long-term storage adequately protected from outside water entry? | Storage has surface water diversions to prevent runoff from entering the storage; AND Perimeter drainage systems to prevent groundwater entry. AND Located outside the 100 year flood zone. | Storage has surface water diversions to prevent runoff from entering the storage; AND Perimeter drainage systems to prevent groundwater entry. AND Protected from inundation from a 100 year flood. | | Little or no control exists over the amount of roof water, surface runoff water, or groundwater entering storage. |
| Do you have an emergency action plan? If yes, is it posted in a visible place? Have employees been trained? | | | | |

| AEM Tier 2 Worksheet: Manure and Fertilizer Storage Table 1: Manure Storage | | Potential Concern | | |
|--|---|--|--|--|
| Factors Needing Assessment | Lower 1 | 2 | 3 | Higher 4 |
| If you utilize temporary manure pile areas, how are they designated and managed? | <p>Earthen areas with medium or fine-textured soils (not shallow to bedrock or with seasonally high water table) are identified for manure pile areas.</p> <p style="text-align: center;">AND</p> <p>Clean water is excluded from the manure pile area.</p> <p style="text-align: center;">AND</p> <p>Manure pile area has at least a 300 foot flow path to a watercourse.</p> <p style="text-align: center;">AND</p> <p>Manure pile areas are not located in a flood plain.</p> <p style="text-align: center;">AND</p> <p>Manure pile is spread as soon as conditions are appropriate.</p> | | | <p>Earthen area with coarse-textured soils and/or soils shallow to bedrock and/or with a seasonally high water table are identified for manure pile areas.</p> <p style="text-align: center;">OR</p> <p>Clean water is not excluded from the manure pile area.</p> <p style="text-align: center;">OR</p> <p>No grass filter area for runoff control exists.</p> <p style="text-align: center;">OR</p> <p>The manure pile areas are located less than a 300 foot flow path to a watercourse, where it frequently floods; or within a spring recharge area.</p> <p style="text-align: center;">OR</p> <p>Manure pile is left unspread.</p> |
| Is there engineering documentation of all permanent transfer structures? | All tanks, pipelines, pumps, etc utilized for transfer of waste have a signed PE design and as-builts. | Major components of the waste transfer structures have a PE design and as-built. | Minor components of the transfer structures have a PE design and as-built. | There is no PE design or as-built of any waste transfer structure. |
| What is the approximate distance from the storage unloading facility to the nearest surface waterbody? | Greater than 500 ft. | 200 – 500 ft. | 100 – 199 ft. | Less than 100 ft. |

| AEM Tier 2 Worksheet: Manure and Fertilizer Storage Table 2: Waste Transfer – Temporary and Permanent Structures | | Potential Concern | | | |
|---|--|--------------------------|----------|-----------------------------|--|
| Factors Needing Assessment | Lower 1 | 2 | 3 | Higher 4 | |
| When manure is being transferred, are adequate safeguards in place? | Automatic high and low pressure shut-offs are in place; AND Pipeline is regularly inspected; AND Communication system is in place. | | | No safeguards are in place. | |
| Do loading and unloading areas contain all spills without contamination or discharge? | | | | | |
| Are perimeter drains protected from spills? | | | | | |
| Do you have two independent valves for gravity outlet system and/or pumped inlet system? | | | | | |
| Do valves leak? | | | | | |
| Do spreaders adequately contain manure while traveling from the farmstead to fields? | | | | | |

| AEM Tier 2 Worksheet: Manure and Fertilizer Storage Table 3: Fertilizer Storage | | Potential Concern | | |
|---|---|---|---------------|--|
| Factors Needing Assessment | Lower 1 | 2 | 3 | Higher 4 |
| Is fertilizer stored on the farm? | | | | |
| What is the vegetated flow distance from fertilizer storage to the nearest watercourse or water well? | Greater than 500 ft. | 200 – 500 ft. | 100 – 199 ft. | Less than 100 ft. |
| Is fertilizer stored within a 100 yr. floodplain? | | | | |
| What type of fertilizer storage facility is used for dry formulations? | Weatherproof storage on impermeable floor (i.e. – sealed concrete). | | | Non-weatherproof storage on a permeable floor (i.e. – gravel or dirt). |
| What type of fertilizer storage facility is used for liquid formulations? | Impermeable secondary containment (i.e. – curbs or dikes present to contain leaks). | Secondary earthen containment exists. Most of spill can be recovered. | | No secondary containment exists. Spills cannot be contained. |
| What precautions are taken when loading fertilizers into field equipment (e.g., planters/drills in the field) to minimize losses to surface- or groundwater? | | | | |
| <p>Benefits to other resources can also be possible while working toward improved water quality. Taking stock of how existing and future management affect soil, water, air, plants, animals, energy, greenhouse gases, people, and economics can result in more effective plans and additional benefits to farms and communities both now and into the future.</p> <p>Additional Comments:</p> | | | | |