

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD
AGRICHEMICAL HANDLING FACILITY

(No.)

CODE 309

DEFINITION

A facility with an impervious surface to provide an environmentally safe area for the handling of on-farm agrichemicals.

PURPOSE

To provide a safe environment on farm and ranch operations for the storage, mixing, loading and cleanup of agrichemicals, retain incidental spillage, retain leakage, and to reduce pollution to surface water, groundwater, air, and/or soil.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where:

- The handling of agrichemicals creates significant potential for pollution of surface water, groundwater, air or soil and a facility is needed to properly manage and handle the chemical operation;
- An adequate water supply is available for filling application equipment tanks, rinsing application equipment and chemical containers as needed for the operation;
- Soils and topography are suitable for construction.

This standard does not apply to the handling or storage of fuels. This standard does not apply to commercial or multi-landowner agrichemical handling operations.

CRITERIA

General Criteria Applies to All Purposes

Plan, design and construct agrichemical handling facilities to meet all federal, tribal, state and local regulations. Producers are responsible for securing the necessary permits to install the required facilities and for properly operating and managing the facility.

The size of the agrichemical storage will be based on the agrichemical use of the farm needed for a single growing season averaged over the last 5 years.

The pad, hoses, pipes, valves, seals, connectors, filters, tanks, and related plumbing material must be compatible with the chemicals being handled and capable of withstanding the intended use.

Outlet drains are not permitted in the agrichemical collection, storage or handling areas.

Posts, pipes, hoses, discharge valves, or other devices may not pass through the floor, containment storage walls, or the sump.

When more than 60 gallons of Class I, II, or III flammable or combustible liquids or a single storage container larger than 5 gallons of Class I, II, or III flammable or combustible liquids are stored in an agrichemical handling facility, National Fire Protection Association (NFPA) 30, Flammable and Combustible Liquids Code, Chapter 4, shall be followed. Storage cabinets or other remedies must be installed.

When the agrichemical handling facility is also used for agrichemical storage, provide sufficient space and designate a separate room or area.

Criteria for Permanent Facilities

Location. Locate the agrichemical handling facility as follows:

- Adjacent to or as near the chemical storage building as practical when chemical storage is not incorporated into the facility;
- As far as practical from streams, ponds, lakes, wetlands, sinkholes, and water wells, with a minimum setback distance of 100 feet;

- Isolated and downwind from residences and other buildings used to store feed, seed, petroleum products, or livestock with a minimum distance as required by local regulations;
- above the 100-year floodplain elevation or, where this is not practical, as a minimum above the 25-year floodplain elevation with authorization from the Kentucky Division of Water. Design the facility to prevent runoff from adjacent land and structures from entering the facility during a 25-year, 24-hour rainfall event;
- At sites that have not been used as stationary mixing/loading sites in the past.

Locate the bottom of the facility a minimum of two feet above the seasonal high water table.

Storage Capacity. Provide a minimum storage volume on the chemical-handling pad of 250 gallons or 1.25 times the volume of the largest storage or spray tank on the pad, whichever is greater.

For unroofed facilities provide storage on the pad as stated above or the volume of the 25-year, 24-hour storm, whichever is greater. Provide a means of storing or field applying, according to chemical label directions, the full storage volume within the 72-hour period following the storm.

Utilize gutters with adequate outlets, diversions or other structural measures as necessary to prevent outside runoff water from entering the facility.

Rinsate Tanks. Provide rinsate tanks of adequate number and size as needed for the type of operation, allowing for separation of non-compatible chemicals. The material type shall be suitable for the type of chemical to be contained in the tank.

Manufactured Components. Manufactured tanks and components shall be structurally sound, capable of withstanding all anticipated loads, and constructed of suitable materials for their intended use. Tanks will be sized based on a single farm owner or operator agrichemical need.

Chemical Handling Pad. Size the pad to accommodate the largest spraying equipment. Allow equipment access from more than one

direction. Provide adequate space for maneuvering around equipment, with a minimum of 2 feet for open facilities and 4 feet for enclosed facilities. When practical base the minimum width of the mixing pad on the width of the spray equipment with the booms retracted.

Slope the pad to allow for drainage to a collection area or sump.

Flexible Membrane Liners. All flexible membranes shall be certified by the manufacturer to be suitable for the intended use.

Design of the flexible membrane shall be in accordance with manufacturer recommendations. All flexible membrane installations shall meet the material and installation requirements of the plans and specifications provided for each installation and shall be certified by the installer.

Table 1 – Minimum Thickness for Membranes

Type	Minimum Thickness
HDPE	40 mil thickness
LLDPE	40 mil thickness
PVC	30 mil thickness
RPR	45 mil thickness
EPDM	45 mil thickness

Concrete Surfaces. To protect the surfaces of concrete, that are exposed to agrichemicals, from penetration and contamination all concrete must:

- Have an admixture for concrete meeting the requirements of ASTM C1240 (micro silica), ASTM C618 (fly ash) or ASTM C989 (ground blast furnace slag),
- Be sealed with a chemically resistant non-vapor barrier forming coating,
- Or take measures to prevent vapor formation under the concrete sealed with a chemically resistant coating.

Coatings must be compatible with the agrichemicals used at the facility and installed in accordance with the manufacturer's recommendations.

Agrichemical Collection. Provide a concrete collection area or sump with adequate dimensions for sediment removal and pump operation. The minimum dimensions of the sump are 3 feet by 3 feet by 2 feet deep. Cover with a metal grate. Design the sump for all anticipated loads. The minimum concrete thickness of the sump walls and bottom is 6 inches with minimum reinforcement steel requirements of #4 bars placed on 12-inch centers in each direction. Construct the metal grate of galvanized steel with a cut out for the sump pump piping. To ensure water tightness use a waterstop at all cold and construction joints. Other types of sumps may be approved on a case by case basis, but must be supported by strength design computations and water tightness details.

Sump Pump - Use a chemically resistant submersible pump or an above ground centrifugal or piston pump that creates a minimum of turbulence within the sump. The pump may be operated either electrically or manually. Provide a filter between the sump pump and sprayer or rinsate tanks. Provide electrical components that are waterproof and explosion proof for the submersible pump and waterproof for the above ground pump. Install all electrical components in accordance with state and local electrical codes.

Structural Design. For the structural design, address all items that will influence the performance of the structure, including loading assumptions, storage tanks, material properties, and construction quality. Indicate design assumptions and construction requirements on the plans.

When using a roof/building to cover the facility, use minimum snow and wind loads as specified in ASCE 7, *Minimum Design Loads for Buildings and Other Structures*.

Locate footings below the anticipated frost depth unless measures are designed to accommodate frost/freeze conditions.

Fabricated structures shall be designed according to the criteria in the following references as appropriate:

- Timber - *National Design Specifications for Wood Construction*, American Forest and Paper Association;

- Steel – *Manual of Steel Construction*, AISC, American Institute of Steel Construction;
- Concrete - *Building Code Requirements for Reinforced Concrete*, ACI 318, American Concrete Institute;
- Masonry - *Building Code Requirements for Masonry Structures*, ACI 530, American Concrete Institute;
- Slabs – Use a five (5) inch minimum concrete slab thickness. Base the required area of reinforcing steel on the subgrade drag theory in accordance with American Concrete Institute, ACI 360, *Design of Slabs-on-Grade*. When heavy loads are to be resisted and/or where a non-uniform foundation cannot be avoided, use an appropriate design such as ASAE EP514 “Design of Concrete Structures for Secondary Containment of Liquid Pesticides and Fertilizers”, and procedure incorporating a subgrade resistance parameter(s) such as ACI 360.

Table 2 - Minimum Required Steel in Concrete Slabs Based on Subgrade Drag Theory, in accordance with ACI 360, *Design of Slabs-on-Grade*.

Maximum Slab Dimensions	Required Steel for 5" Thick Slab with Gravel Subgrade	
	A _s	Example
≤ 60'	0.058	6x6-#6 gage, or 6x6-W2.9 x W2.9
> 60' ≤ 100'	0.126	#4 bar @ 18"
> 100' ≤ 160"	0.20	#4 bar @ 12"
> 160' ≤ 200'	0.31	# 5 bar @ 12"

Water Supply. Provide an adequate water supply for mixing agrichemicals, rinsing tanks and containers, and for emergency health and safety needs as appropriate for the facility. Provide all pipelines, hoses, backflow prevention and other hardware as needed.

Plumbing - Design all plumbing to allow for easy drainage to prevent freezing. Use corrosion resistant components. Outlet drains are not permitted in the chemical storage, mixing, loading and collection areas.

Entrance - Provide a gravel, concrete or otherwise suitable entrance for the equipment and to prevent erosion and the tracking of

sediment onto the chemical-mixing pad. Minimum width of the entrance is 4 feet wider than the widest piece of equipment used at the facility. The minimum length of the entrance pad is 1.5 times the largest wheel circumference of the equipment used at the facility.

Mixing Platform - A mixing platform may be used to facilitate the filling of the spray equipment. The recommended minimum platform size is 3 feet high, with a minimum work area of 3 feet by 4 feet and is moveable on the pad.

Safety. A permanent water supply line is required at the facility for an emergency washing area. Locate the emergency washing area where it is easily accessible to the facility user. Include with the emergency washing area a faucet and emergency eye wash station. A drop shower is strongly recommended.

Provide adequate ventilation at all times for enclosed buildings using natural or mechanical means.

Post highly visible waterproof warning signs, such as "CAUTION, CHEMICAL STORAGE AREA," or similar signs at all entrances to the facility. Place "NO SMOKING" signs both outside and inside the facility. Bilingual signs are recommended. All signs (size, location, color, etc.) shall meet the requirements of Occupational Safety and Health Administration (OSHA) 29 CFR 1910.144 and 29 CFR 1910.144; American National Standards Institute (ANSI) Z35.1-1979, Z35.4-1973, Z525.1-1991, and Z535.2-1991; and any applicable federal, state, or local laws and regulations.

Where chemicals are stored on-site, provide a lockable secure area for protection against vandalism or unauthorized access. Provide appropriate safety devices including ventilation and appropriate lighting. A fire extinguisher (ABC use rating, dry chemical, minimum 20 pound capacity) is required.

Vegetation. Stabilize disturbed areas, as necessary, to prevent erosion, in accordance with the conservation practice standard for Critical Area Planting, Code 342.

Criteria for Portable Facilities

The portable agrichemical handling facility is a manufactured portable device that can be easily moved from field to field and will meet the needs of the user.

Pad. The pad shall be constructed of durable material that is chemically resistant for the intended agrichemicals. The minimum containment capacity of the pad is 1.25 times the volume of the largest individual agrichemical container or tank that will be located on the pad. Include a sump or other provisions for easy recovery of spilled liquid.

Rinsing Devices. Design rinse devices so that residual contents of agrichemical containers can be adequately rinsed directly from the container to the spray tank. Design the rinse system to operate from the nurse tank discharge pump or a separate pump that provides adequate pressure. Verify with the manufacturer of the facility that any pump to be used in pressure rinsing is compatible with the rinse device.

CONSIDERATIONS

For permanent facilities, the agrichemical handling facility may cause an increase in water use at the site from the mixing of agrichemicals and rinsing of agrichemical sprayers, containers and agrichemical-handling pad.

Consider providing a roof over permanent facilities.

Consider installing an apron at the facility entrance to minimize sediment transport onto the pad.

Consider providing a mixing platform for filling agrichemical sprayers.

For portable handling facilities consider using a top/bottom-loading valve with built-in check valve in the hose from the nurse tank to the spray tank. This will enable the operator to remain on the ground while filling the sprayer.

PLANS AND SPECIFICATIONS

Prepare plans and specifications for constructing agrichemical mixing facilities in accordance with the criteria contained in this standard, to achieve its intended use.

Portable agrichemical handling facilities are manufactured items. Review plans and specifications submitted by the manufacturer to ensure that the proposed facility meets the requirements of this standard.

OPERATION AND MAINTENANCE

An operation and maintenance (O&M) plan shall be developed that is consistent with the purpose of the practice, the intended design life, safety requirements, design criteria, and all local, state, and federal laws and regulations.

The O&M Plan is to address the following:

1. Brief description of the facility. Define parameters used to size and design the facility such as storage tank and equipment sizes.
2. The facility shall not be used for purposes other than the storing, mixing, loading, cleaning, and maintenance of materials and equipment used for agrichemical application.
3. An inventory of agrichemicals to be stored or handled at the facility. Material Safety Data Sheets may be included in the plan.
4. The proposed method of handling and disposing of rinsate, washwater, and spills.
5. A process for handling accumulated rainfall.
6. A process for handling accumulated sediment.
7. A strategy for cleaning surfaces between different agrichemical mixing operations.
8. An inspection plan of structural components such as the condition of concrete, curbing, sump, access roads, building structure, etc. Note the timing of inspections, conditions that would cause concern, and required actions as appropriate.
9. Any weekly, monthly, or annual maintenance that may be necessary for the proper functioning of the system components including, but not limited to, concrete surfaces, sumps, pumps, hoses, pipelines, building materials, electrical equipment, and other materials and equipment.
10. A schedule of any required written inspection and maintenance reports.
11. Proper winterization of the facility.
12. Required safety signage.
13. An Emergency Response Plan with safety procedures in the event of an accidental spill, exposure, fire, or other hazardous incident. Provide a list of safety equipment, contact names, and phone numbers.

REFERENCES

- American Concrete Institute, *ACI codes*, Detroit, MI.
- American Forest and Paper Association, *National Design Specifications for Wood Construction*, Washington, DC.
- American Institute of Steel Construction, *AISC, Manual of Steel Construction*, Chicago, IL.
- American Society of Agricultural Engineers, ASAE EP514, *Design of Concrete Structures for Secondary Containment of Liquid Pesticides and Fertilizers*, St. Joseph, MI.
- American Society of Civil Engineers, ASCE 7, *Minimum Design Loads for Buildings and Other Structures*, Reston, VA.
- American Society for Testing and Materials. *ASTM Standards*. Philadelphia, Pennsylvania.
- Daum, D. R., and D. J. Meyer. *Pesticide Storage Building*. Pennsylvania State University, Agricultural Engineering Department.
- Doane's Agricultural Report. *Chemical Containment Facilities*. Vol. 53, No 36-5.
- Midwest Plan Service, 1995. *Designing Facilities for Pesticide and Fertilizer Containment MWPS-37*, Ames, IA.
- Kammel, D. W., 1988. *Protective Treatment for Concrete*. Agricultural Engineering Department, University of Wisconsin.
- Noyes, R. I., 1989. *Modular Farm Sized Concrete Agricultural Chemical Handling Pads*. Oklahoma State University, Agricultural Engineering Department.
- Noyes, R. T., and D. W. Kammel, 1989. *A Modular Containment, Mixing/Loading Pad*. ASAE Paper No 891613, American Society of Agricultural Engineers, Winter Meeting, New Orleans, LA.
- USDA, Natural Resources Conservation Service. *Preparation of Engineering Plans*. Engineering Field Handbook, Chapter 5.
- USDA, Natural Resources Conservation Service, *Critical Area Planting*, Code 342, Conservation Practice Standards.