USDA
NATURAL RESOURCES
CONSERVATION SERVICE

INTERIM
MARYLAND CONSERVATION
PRACTICE STANDARD

AGRICHEMICAL MIXING FACILITY

CODE 702
(Reported by No.)

DEFINITION

An agrichemical mixing facility is a permanent structure with an impervious surface to provide an environmentally safe area for the mixing of on-farm agrichemicals, such as pesticides and fertilizers that are used in spraying operations of orchards, vineyards and cropland.

PURPOSE

This practice may be applied as part of a conservation management system to support one or more of the following purposes:

1. To provide a safe environment for the mixing and loading of chemicals and to retain incidental spillage for proper handling and disposal;
2. To reduce pollution to surface water, groundwater, and/or soil.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where:

1. The lack of adequate facilities for the mixing of chemicals creates significant potential for pollution of surface water, groundwater or soil;
2. A water supply is adequate for filling application equipment tanks, rinsing application equipment and chemical containers;
3. Soils and topography are suitable for construction; and,
4. An impermeable pad is needed to properly manage chemical operations.

CONSIDERATIONS

The agrichemical mixing facility will cause an increase in water use at the site from the mixing of chemicals and rinsing of chemical sprayers, containers and chemical-mixing pad. The quantity of runoff will increase due to the area roofed at the facility.

CRITERIA

Location

Locate the agrichemical mixing facility as follows:

1. Adjacent to or as near the chemical storage building as practical;
2. As far as practical from streams, ponds, lakes, wetlands, known sinkholes, subsurface anomalies, and wells, with a minimum distance of 100 feet;
3. Isolated and located downwind from residences and other buildings used to store feed, seed, petroleum products, and livestock;
4. Located 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 Maryland Department of the Environment. Design the facility to prevent runoff from adjacent land and structures from entering the facility during a 25-year, 24-hour rainfall event;
5. At sites that have not been used as stationary mixing/loading sites in the past.

Components

Include those components necessary to properly handle the chemical mixture and prevent pollution of the environment.

Outlet drains are not permitted in the chemical collection area or the chemical-mixing and load-

ing pad. Components of a complete facility include, but are not limited to, the following:

1. A sealed concrete pad for chemical mixing and loading;
2. A chemical collection sump, sump pump, and safety devices;
3. Adequate water supply for mixing chemicals, rinsing tanks and containers, and for emergency health and safety needs;
4. Water supply pump, pipeline, hoses, backflow prevention devices, and other hardware needed for water control;
5. Emergency washing area;
6. Tanks for storage of rinsate;
7. Where needed, a storage space of sufficient size to accommodate short-term storage of chemicals;
8. Electrical components such as lights, fans, outlets, switches, etc.;
9. Warning signs, fire extinguisher, first aid kit, protective clothing, and other appropriate safety devices;
10. Approved Operation, Maintenance, and Safety Plan.

Although optional, it is highly recommended that the facility be roofed, and that a mixing platform be available when filling chemical sprayer. It is preferable to have a separate building or room for chemical storage.

Federal, State, and Local Laws

Design and construct the agrichemical mixing facility in accordance with all federal, state and local laws. Specific requirements for pesticide storage (including insecticides, herbicides, fungicides, etc.) are being developed by the Maryland Department of Agriculture, Pesticide Regulation section, which is responsible for enforcing federal and state pesticide regulations. Maryland Cooperative Extension has developed guidelines for the handing and storage of pesticides. Refer to the "Maryland Pesticide Applicator Training Series - Core Manual" for details.

Producers are responsible for securing the necessary permits to install the required facilities and for properly managing the facility.

Pad

The size of the concrete pad used for the chemical mixing operation shall be large enough to accommodate the largest spraying equipment and may allow for access from more than one direction. Provide adequate space for easily maneuvering around the equipment and to accommodate the worker. A minimum of 5 feet on each side of the sprayer is suggested. Where possible the minimum width of the facility shall be determined with the booms of the spray equipment retracted.

To prevent the surface from contamination from chemicals, all concrete exposed to chemicals must have a Micro-silica admixture for concrete meeting the requirements of ASTM 1240 Designation C or be sealed with a chemically resistant non-vapor forming coating.

Slope the chemical-mixing pad to allow for drainage of water and pesticide spills to a collection sump.

Prevent outside runoff water from entering the facility. Provide a minimum storage capacity on the chemical-mixing pad, including the sump, of 250 gallons or equal to 1.25 times the largest storage or spray tank brought onto the pad, whichever is greater. For an unroofed mixing/loading pad, provide storage as stated above or the volume of the 25-year, 24-hour storm, whichever is greater.

Chemical Collection Sump

Construct a concrete box sump, under the pad, with minimum dimensions of 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 8 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.

All electrical components shall be waterproof and explosion proof for the submersible pump and waterproof for the above ground pump. Install all electrical components in accordance with local and national electrical codes.

Water Supply, Pump, and Pipe

Provide a reliable water supply at the pad with a minimum rate of 5 gallons/minute for filling the sprayers and rinsing the chemical containers, spray tanks, and chemical-mixing pad. A hose or pipeline shall be installed for conveyance of water from the water supply to the pesticide containment facility. Provide back flow preventers, antisiphoning devices, and a method to allow winterizing of the pipelines on all water supply lines. Locate the water supply pump and well outside of the containment facility.

Plumbing

All parts of the plumbing system shall be corrosion resistant. Outlet drains are not permitted in the chemical storage, mixing, loading and collection areas. Design all plumbing to allow for easy drainage to prevent freezing.

Emergency Washing Area

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.

Entrance

The entrance to the chemical-mixing pad shall be graveled and/or paved, or otherwise treated to provide a suitable entrance for the equipment and to prevent erosion and the tracking of sediment onto the chemical-mixing pad. Minimum width of the entrance shall be 4 feet wider than the widest piece of equipment used at the facility. The length of the entrance shall be a minimum of 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 2.5 to 3 feet high, with a minimum work area of 3 feet by 4 feet and is moveable on the pad.

Rinsate Storage Tanks

Provide a rinsate storage tank to temporarily hold rinsates resulting from cleaning the chemical-mixing pad or sprayer. Locate the rinsate tank(s) on the chemical-mixing pad.

Label the tanks with type of chemicals. Tanks shall be fiberglass, polyethylene, or other durable material and have the capacity to meet the requirements of the operation plan. Provide a separate tank for each target crop. Herbicides should be kept in separate tanks from any other compounds.

Bulk Storage Tanks

Where bulk tanks (56 gallons or larger) are to be located within the mixing and storage area, a secondary containment structure shall be designed and constructed to contain discharges and prevent escapes, runoff, and leaching of pesticides. The secondary containment area (walls and pad) must be impervious and constructed to hold 110% of the volume of the largest storage tank.

Safety

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 secure area for protection against vandalism or unauthorized access. The chemical storage area shall include appropriate safety devices including ventilation, lighting, fire extinguisher (ABC use rating, dry chemical, minimum 20 pound capacity), and a smoke detector with an audible alarm.

Vegetation

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

Structural Design

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

The use of a roof/building to cover the pad is strongly encouraged. Use minimum snow and wind loads as specified in ASCE 7, Minimum Design Loads for Buildings and Other Structures. Meet all local and state codes.

Fully enclosed buildings shall be adequately ventilated by natural or mechanical means at all times.

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

Minimum design requirements are as follows:

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

2. Concrete - *Building Code Requirements for Reinforced Concrete, ACI 318*, American Concrete Institute;

3. Masonry - *Building Code Requirements for Masonry Structures, ACI 530*, American Concrete Institute;

4. Slabs – Use a six (6) inch minimum concrete slab. 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* See Table 1; When heavy equipment loads are to be resisted and/or where a non-uniform foundation cannot be avoided, use an appropriate design procedure incorporating a subgrade resistance parameter(s) such as ACI 360.

Table 1 - Minimum required steel in concrete slabs based on subgrade drag theory in accordance with ACI 360, *Design of Slabs-on-Grade*

Maximum Slab Dimension	Required Steel for 6" Thick Slab with Gravel Subgrade	
	A_s	Example
≤ 40'	0.058	6 x 6-#6 gage, or 6 x 6-W2.9 x W2.9
>40' ≤ 90'	0.126	#4 @ 18"
>90' ≤ 140'	0.20	#4 @ 12"
>140' ≤ 220'	0.31	#5 bar @ 12"

Materials

Rock - Gravel (aggregates) must meet the requirements of Maryland Department of Transportation, State Highway Administration Standard Specifications for Construction and Materials, Section 901.01.

Geotextile - Geotextile may be woven or non-woven and must meet the requirements of Maryland Department of Transportation, State Highway Administration Standard specifications for Construction and Materials, Section 921.09, Class SE.

Concrete - Use type I cement, 28 day compressive strength of 4000 psi, 5% to 7.5% air entrainment with a slump of 1.5 inches to 3 inches. A concrete super plasticizer admixture may be used during placement.

SPECIFICATIONS

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

OPERATION AND MAINTENANCE

Prepare an operation and maintenance plan in accordance with the requirements of this standard, and in keeping in conformance with all local, state, and federal laws and regulations.

Include in the operation and maintenance (O&M) plan an inventory of chemicals used at the facility and the methods proposed for handling of sediment, rinsate, and potential spills, an emergency response plan with the emergency spill and poison center telephone numbers. Material Safety Data Sheets (MSDS) for chemicals used shall be attached to the O&M plan. Post a copy of the O&M plan at the agrichemical mixing facility.

The agrichemical mixing facility shall be kept free of items not necessary for the storing, mixing, loading, and cleanup operations. The facility shall not be used for purposes other than the storing, mixing, loading, cleaning and maintenance of materials and equipment used for chemical application.

Perform normal winterization procedures to prevent damage to the facility and to chemical containers when weather conditions dictate.

Do not drain rinse water or rinsate from the sprayer onto the pad as a standard practice due to the probability of contamination by soil, trash and other pesticides.

Thoroughly clean the sump between the mixing and loading of different chemicals. The resulting rinsate can be applied as a dilute pesticide to a labeled site or used as dilution water for subsequent batches of the pesticides that are labeled for the same crop. The sump shall be pumped dry at the end of each day of operation.

Sediment from the sump shall be removed with proper precautions taken to reduce exposure of the worker to any potential contaminants in the sediment. Sediment from a pesticide is considered the same weight active ingredient as the formulated chemical being mixed. If this sediment is land applied, apply it to the target crop field at a rate below the label recommendation. Remove the sediment from the sump prior to switching from one chemical to another chemical.

All material removed from the chemical-mixing pad and sump must be properly utilized or disposed of. Appropriate uses and disposal methods are:

1. Application to the target crop as pesticide;
2. Use as dilution water in mixing to be applied to the target crop; or,
3. Disposal as waste in conformance with all local, state, and federal regulations.

Empty rinsate tanks, used as holding tanks for sump discharge, as soon as possible. Rinsate tanks shall not be used to store sump discharges of different chemicals. The rinsate can be applied as a dilute pesticide or used as dilution water for subsequent batches of pesticides that are labeled for the same crop.

Inspect the agrichemical mixing facility periodically to ensure proper operation. The inspection shall include, but is not limited to:

1. Concrete pad;
2. Condition of protective coating, when used;
3. Operation of back flow prevention devices;
4. Hoses, pipes, valves, connectors, filters, tanks, and related plumbing material;
5. Sump and sump pump;
6. Safety equipment, including emergency washing area;
7. Electrical systems and controls;
8. Roof and structural integrity of facility;
9. Access roads and ramps;
10. Drainage around building;
11. Labeling of rinsate storage tanks that will ensure proper methods for applying rinsate back to the land;
12. Chemical inventory.

SUPPORTING DATA AND DOCUMENTATION

Field Data and Survey Notes

Record on survey note paper, SCS-ENG-28 & 29, the following minimum data:

1. A topographic survey of the site location;
2. Location of all buildings, wells, and other permanent features adjacent to the site;
3. Profile from the site to possible drain outlet;
4. Size and capacity of all sprayers;
5. Soil investigation notes and potential high water.

Design Data

Record on appropriate engineering paper. For guidance on the preparation of engineering plans see Chapter 5 of the Engineering Field Handbook, Part 650. The following is a list of the minimum required design data:

1. A plan view of the facility with contours, buildings, well, streams, etc.;
2. Detail designs of the components: pad, curb, sump, pump configuration, etc.;
3. Calculations showing design and required storage capabilities;
4. List of quantities with supporting computations;
5. Erosion and sediment control measures, and surface water control devices;
6. Show construction specifications on drawings.

Construction Check Data

Record on survey note paper, SCS-ENG-28, or other appropriate engineering paper. Plot the survey data on the plans in red. The following is a list of minimum data needed for As-builts:

1. Documentation of site visits on CPA-6. Include the date, who performed the inspection, specifies as to what was inspected, all alternatives discussed, and decisions made and by whom;
2. Final elevations, depths and dimensions of the curb, sump, etc.;
3. Size and location of all rinsate tanks;
4. Location of buried pipelines and power cables where installed as part of facility;
5. Final quantities and documentation for quantity changes, and materials certification;
6. Sign and date check notes and plans by someone with appropriate approval authority. Include statement that practice meets or exceeds plans and NRCS practice standards.

REFERENCES

1. American Society for Testing and Materials. *ASTM Standards*. Philadelphia, Pennsylvania.
2. Curtis, W. M., and A. E. Brown. *Maryland Pesticide Applicator Training Series - Core Manual.* University of Maryland, Maryland Cooperative Extension, College Park, MD.
3. Daum, D. R., and D. J. Meyer. *Pesticide Storage Building.* Pennsylvania State University, Agricultural Engineering Department.
4. Doane's Agricultural Report. *Chemical Containment Facilities.* Vol. 53, No 36-5.
5. Kammel, D. W., 1988. *Protective Treatment for Concrete.* Agricultural Engineering Department, University of Wisconsin.
6. Noyes, R. I., 1989. *Modular Farm Sized Concrete Agricultural Chemical Handling Pads.* Oklahoma State University, Agricultural Engineering Department.
7. 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.
8. USDA, Natural Resources Conservation Service. *Conservation Practice Standard for Critical Area Planting, Code 342*. Maryland Field Office Technical Guide, Section IV.
9. USDA, Natural Resources Conservation Service. *Preparation of Engineering Plans.* Engineering Field Handbook, Chapter 5.