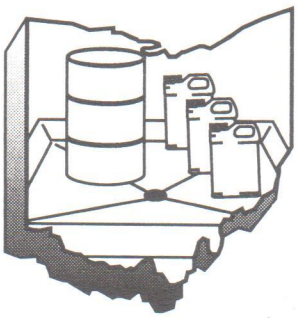

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On-Farm Agrichemical Mixing/Loading Pad

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Agrichemical storage and handling sites present a high potential risk for polluting surface and ground water because of the concentration, quantity and type of chemicals used. Often, chemical application equipment is loaded and rinsed in the same location, often near a well or surface water supply or drainageway. A recent study indicates that up to 90 percent of water pollution cases due to agrichemicals are the result of improper material handling and spills occurring during the loading and unloading of spraying equipment.

Pesticides and other agrichemicals are a necessary component of efficient agricultural production. However, when used improperly or indiscriminately, they can create a hazard and can be harmful to water and land resources, people and animals. Because of the potential for contamination of soil and water resources, it is important to protect areas where loading and rinsing of sprayers and equipment occurs.

Handling Facility

An agrichemical handling facility should provide for handling practices that deter water and soil pollution. Proper facility planning and design can reduce the risk of potential pollution from agrichemical handling. An agrichemical handling facility (Figure 1) should include:

- A self-contained mixing/loading area.
- Safe, secure storage of agrichemicals.
- Secondary containment for bulk storage of agrichemicals.
- Proper storage and disposal of liquid and solid wastes.
- First-aid and worker safety equipment.

An ideal facility should:

- Provide separate containment areas for each type of activity associated with handling agrichemicals.

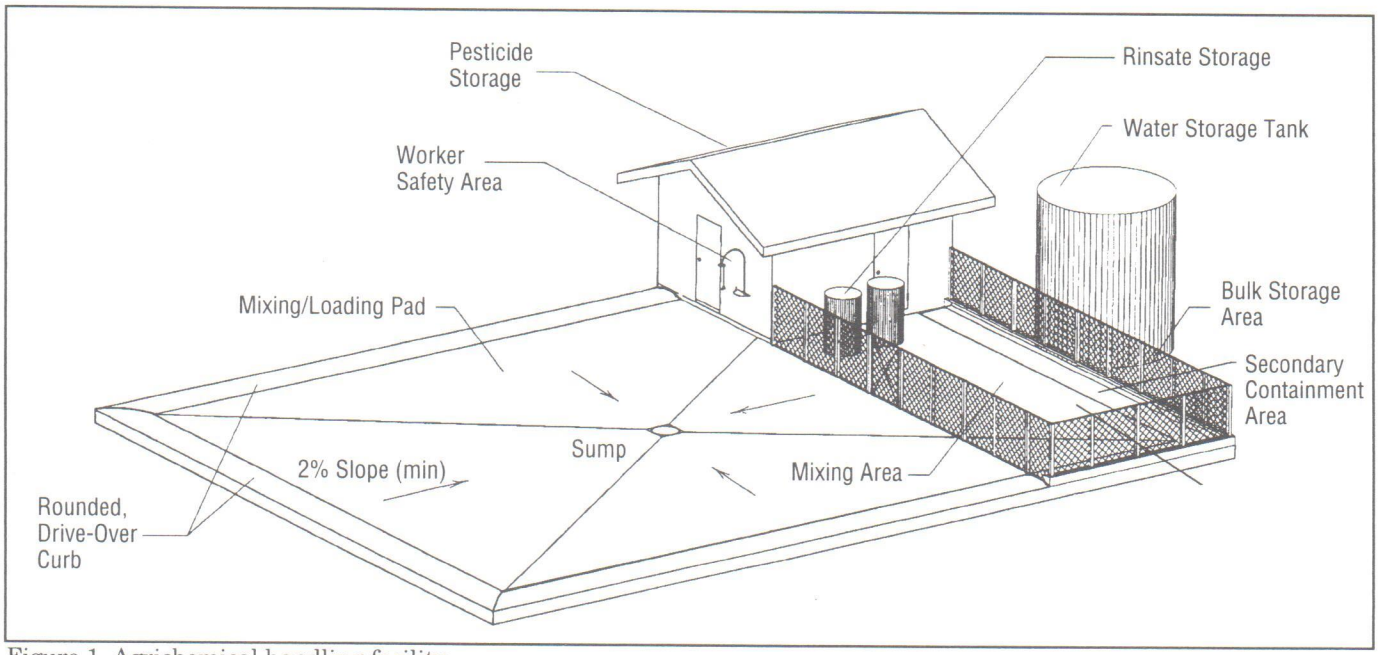

Figure 1. Agrichemical handling facility.

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- Contain accidental spills and tank or sprayer leaks.
- Collect spills that occur during mixing and loading activities.
- Collect and store rinsate from equipment cleaning and maintenance.
- Be easy to use and access.

Containment

The primary objective of a handling facility is to provide containment of agrichemicals to protect the environment. The facility design provides for separate and distinct areas of containment. Usually this is separated into at least three distinct areas, as show in Figure 2.

- Mixing and loading.
- Bulk liquid storage.
- Chemical storage.

Mixing/Loading Pad

The mixing and loading area is the primary component of an agrichemical handling facility. Typically, this is a sloped and curbed concrete pad with a shallow sump, as shown in Figure 3. Provide at least a 2 percent slope to the sump to promote drainage and facilitate cleaning. All activities associated with handling agrichemicals should be conducted on the mixing/loading pad. These may include:

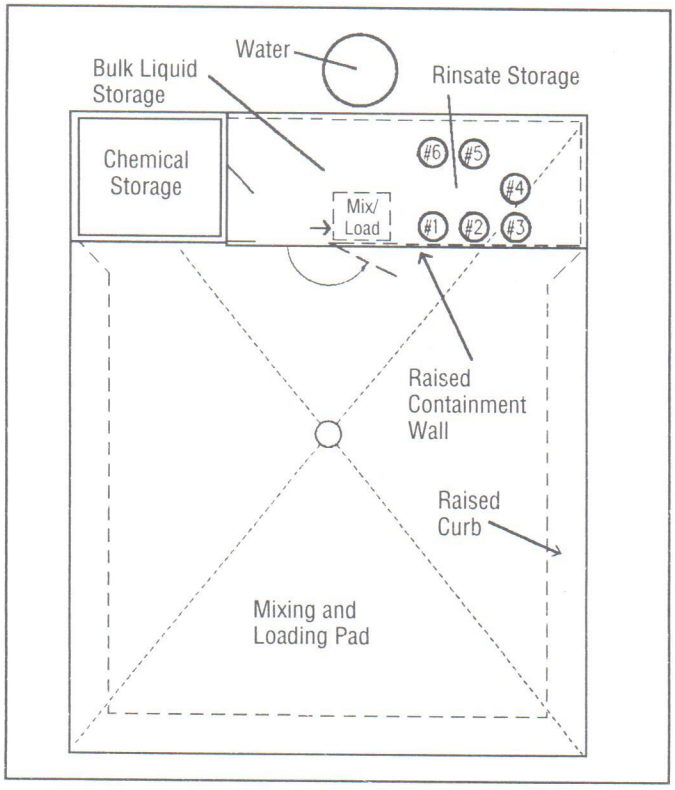

Figure 2. Containment areas.

- Handling and mixing of agrichemicals.
- Transfer of agrichemicals to or from storage.
- Containment and collection of rinsate and exterior wash water.
- Secondary containment of leaks and/or spills from spray tanks or storage containers.
- Loading sprayers.
- Unloading transport vehicles.
- Unloading and clean-out of sprayer tanks and plumbing.
- External washing of application equipment.

Park farm equipment on the mixing/loading pad during filling, rinsing and maintenance. Also, perform all chemical spraying equipment repairs in this area to collect any material that may leak or is drained from the tanks or booms.

Size the pad to handle the largest piece of spraying or transport equipment. Clean the pad after any spill. Collect wash water and/or rinsate from the cleaning of the pad or equipment and either pump the water collected back to the sprayer tanks for re-application or into storage tanks for later use. More than one rinsate storage tank may be needed for different products used. These rinsates can be used as make-up water for subsequent sprayer loads or properly disposed of following label directions.

A thorough rinsing of the sprayer tank may be needed when changing agrichemicals for different applications. When the situation arises, drain rinsate directly from the sprayer and transfer it directly into rinsate storage tanks.

A small storage building can be located on or adjacent to the pad for pesticide storage and mixing (Figure 3). A secure, fenced-in area for mixing and loading activities and rinsate tanks is needed for secondary containment. To contain potential spills and allow for reclaiming spilled materials, provide secondary containment for all areas where chemicals are stored. All rinsate storage tanks and bulk liquid storage tanks must be placed within the secondary containment area. Size the containment area to provide storage capacity to contain at least 110 percent of the volume of the largest storage tank.

If the mixing/loading pad does not have a roof, rainwater falling on the pad may be contaminated and therefore must also be collected and stored. Discharge of any rainwater containing agrichemical residues from an improperly cleaned pad could result in a hazard and potential site cleanup liability. Collect and store contaminated rainfall until properly disposed. Roofing a mixing and loading pad may be a viable alternative compared to potential liabilities.

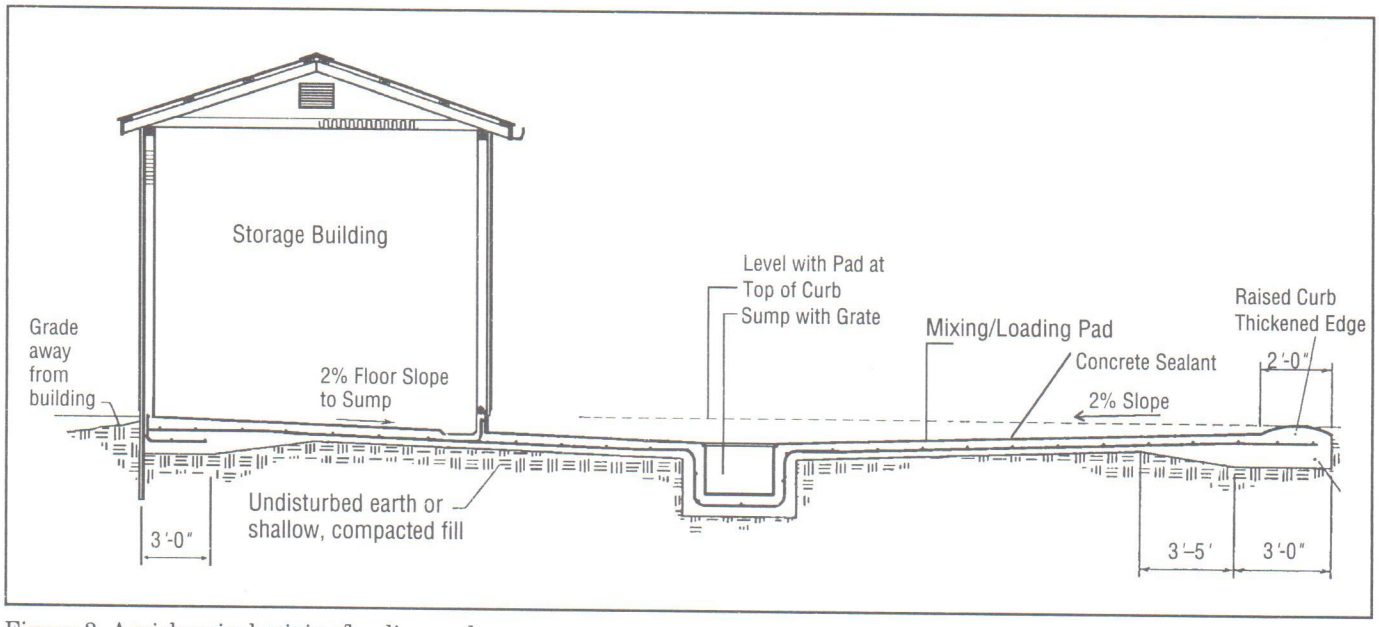

Figure 3. Agrichemical mixing/loading pad.

Site Selection

To prevent frost heaving of the pad, the area around the pad should be well drained. Locate the pad to promote good surface drainage away from the pad (Figure 3). The pad should be elevated and the earth grade established so it slopes away from the pad.

Contain all water that falls on the mixing/loading pad. Divert clean runoff away from the pad to reduce the volume of wastewater to be handled.

Concrete Specification

High quality concrete is extremely important for the mixing/loading pad and secondary containment. The concrete pad must be watertight and resist deterioration from agrichemicals. In normal construction, strength and workability are usually the most important factors in concrete selection. However, strength alone may not be sufficient for agrichemical pads due to chemical exposure. A combination of strength and durability, and resistance to chemical attack are important for the severe service expected.

The surface of low quality concrete pads often deteriorates rapidly because of chemical attack, physical abuse and weathering. Cracks may develop that allow chemicals and wastewater to leak into the soil below the containment pad. Mortar quality and surface finish are as important as concrete strength, because they are in direct contact with the chemicals. Surface durability and strength improve with a reduction in water content, an increase in cement content or both.

Watertight concrete design is critical to avoid leaks. Watertightness depends on nonporous aggregate and high-quality watertight portland cement paste. High-quality concrete requires the proper water-to-cement ratio and moist curing. High water-content cement increases the potential for concrete shrinkage, which leads to cracks. Air entrained concrete should be used for all containment pads. Air entrainment improves water tightness by improving workability, reducing aggregate segregation and bleeding, and increasing the density.

To ensure the delivery of high-quality concrete, the order must contain the following information: strength, minimum cement content, maximum coarse aggregate size, slump, and amount of entrained air. The minimum specifications are:

- Type I or Type II cement with air entrainment. Type II provides moderate sulfate resistance.
- Minimum 28-day strength: 4,000–4,500 psi (6.5–7 bag mix)
- Air-entrainment: 5%–7.5%

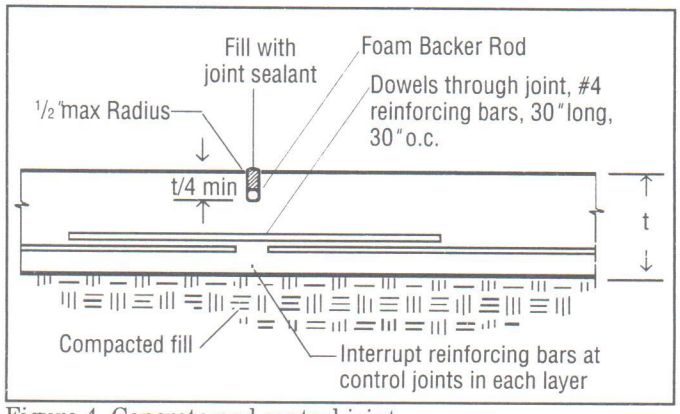

Figure 4. Concrete pad control joint.

- Water-cement ratio: 0.40–0.45
- Slump: 1.5″–3″
- Super plasticizer admixture for improved plasticity, water tightness and strength of low slump concrete. Plasticizer to be added at site.
- Immersion or moist cured for at least 7 days (28 days preferred for maximum strength).
- Continuous pour in one day, no cold joints.
- Vibration during placement at 5,000 to 15,000 RPM frequency for minimum aggregate segregation.
- Aluminum or magnesium float finish to improve washing and cleanup.
- Clean, impervious aggregate: 1″–1.5″.

Controlling Cracks

Use control joints to minimize floor cracks in concrete pads greater than 30′ in any direction. Proper jointing induces concrete to crack in predictable, straight lines. It is much easier to caulk or seal a straight joint than a random crack that may develop in unjointed concrete. Joints are usually larger than cracks and will hold sealers much better. Fill control joints with an elastomeric polyurethane base sealer to prevent leakage. Elastomeric sealers are necessary to allow the material to bridge the crack or joint and adhere to the concrete giving a water-tight seal. Check and replace sealing compound at least every two years. Space control joints no more than 30′ in both directions in concrete slabs with steel reinforcing. Locate control joints so they are accessible and cracks can be monitored and sealant can be easily applied, repaired or replaced. In containment pads with steel reinforcing, interrupt the reinforcement steel and place a 30″ long #4 reinforcing bar every 30″ along the joint, Figure 4.

Pesticide and Chemical Storage Area

Provide an isolated, secured area for pesticide and chemical storage. Provide separate storage areas for fertilizer and pesticide containment. Do not use this area to store feed, seed or fuel. The storage area can be a fenced outdoor area, storage building for year-round storage or bulk tank storage inside an earth or concrete dike of non-permeable material. Design the storage area to prevent unauthorized entry, use or theft, and protect from temperature extremes. Proper agrichemical storage protects workers, visitors, children and animals from unknown or accidental exposure to agrichemicals.

Post the outside of pesticide storage facilities with visible signs to indicate the designated use. Examples of signs include "Pesticide Storage" and "No Smoking."

Worker Safety

Provide an eyewash and deluge shower adjacent to the mixing/loading area to rinse spilled chemicals from the eyes, face and body. Provide personal protective equipment for each worker. Emphasize to workers what type of clothing and safety equipment to wear when handling chemicals. A first-aid kit and a spill response kit are needed to handle accidents in a timely manner. Install fire extinguishers in easily accessible locations.

Summary

Handling agrichemicals represents a potential risk for contamination of soil and water resources and a risk to human health. A properly designed chemical handling facility helps reduce the risk of potential contamination and the legal liability arising from potential accidents during handling. A mixing/loading pad provides positive containment of agrichemicals used on the farm to protect the environment, including soil, surface water and ground water resources. Use the mixing/loading pad to contain accidental spills until the product can be properly recovered or disposed.

For more information on design and construction of mixing/loading pads and agrichemical containment facilities, see *Designing Facilities for Pesticide and Fertilizer Containment*, MWPS-37, Midwest Plan Service publication. It is available from your county office of Ohio State University Extension.

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