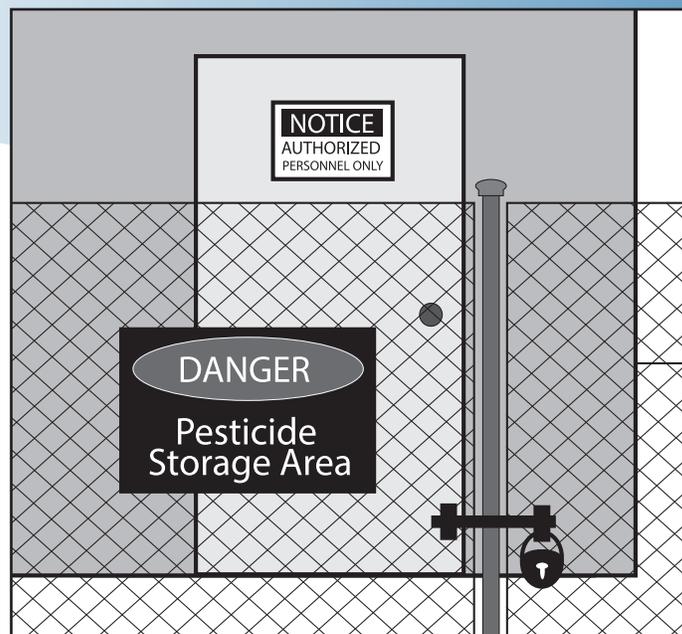


Best Management Practices for Pesticide and Fertilizer Storage and Handling

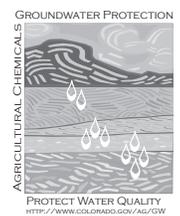


Principal authors: Troy Bauder Reagan Waskom Claudia Arrieta
 Extension Water Quality Specialist Director Research Associate
 Colorado State University Colorado Water Institute Colorado State University

In association with: Colorado Department of Agriculture and the Agricultural Chemicals and Groundwater Protection Program

Reviewers: Thia Walker CSU Pesticide Safety Education Specialist
 Rob Wawrzynski CDA Groundwater Program Coordinator
 Erik Wardle CSU Water Quality Associate

Edits and design by Lindsey Middleton



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Published by Colorado State University Extension in cooperation with Colorado Department of Agriculture.

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Best Management Practices for Pesticide and Fertilizer Storage and Handling

Storage and handling of pesticides and fertilizers in their concentrated forms pose the highest potential risk to ground or surface water from agricultural chemicals. For this reason, it is essential that facilities for the storage and handling of these products be properly sited, designed, constructed, and operated. Colorado law (C.R.S. 25-8-205.5(3)(b)) requires operations handling bulk quantities of agricultural chemicals to comply with containment regulations. Operators who handle amounts of pesticides and fertilizers which fall below the thresholds for mandatory containment should observe Best Management Practices (BMPs) for handling these concentrated products.

Fire hazards, environmental hazards, and economic considerations—such as liability and property transfer problems—should motivate operators

to evaluate current agricultural chemical practices and facilities. This publication contains recommendations for operators who wish to properly construct new facilities or optimize existing facilities. Consult with local authorities and professional engineers for specific zoning ordinances and technical advice prior to site selection and construction.

Agricultural chemical facilities include storage and the mixing and loading site. The size and function of these facilities will vary from small private land owners to large commercial dealers. However, all operators need properly designed facilities that promote worker safety and environmental protection.

Proper management of the agricultural chemical facility is an important aspect of responsible

pesticide use. Use of poor practices at these sites can lead to serious liability problems and a poor public image for agricultural applicators and dealers (Figure 1).

The ideal management practices:

- Minimize the amount of agricultural chemicals stored and handled
- Reduce waste such as rinsate, containers, and partially used product
- Maintain good records of all chemical use
- Provide preparation, equipment, and training to respond to emergencies

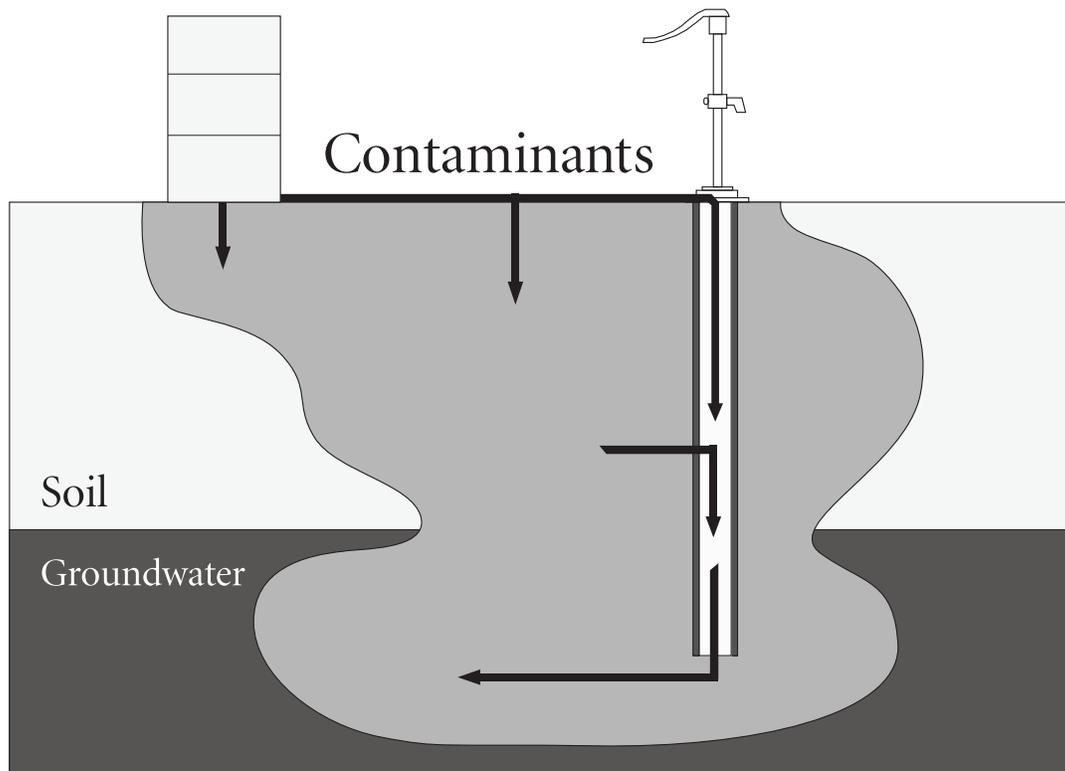


Figure 1. Concentrated products handled near water resources present the highest risk of drinking water contamination.

Regulations

Several laws govern facilities for pesticide and fertilizer storage, mixing, and loading. These are predominantly federal laws under the jurisdiction of the US Environmental Protection Agency (USEPA) or state laws under either the Colorado Department of Agriculture (CDA) or the Colorado Department of Public Health and Environment (CDPHE).

However, more stringent local ordinances have been adopted in some Colorado municipalities. The intent of most of these regulations is to develop standards that promote good storage and handling practices to protect the environment. The principles behind these regulations are BMPs designed to protect water quality, and they are applicable to all pesticide and fertilizer facilities.

Colorado Revised Statutes (C.R.S.) 25-8-205.5(3) (b) and its associated rules require specific facilities for

operators that handle bulk agricultural chemicals above given thresholds and time periods. See Table 1 to determine whether your operation must comply with this statute.

Field mixing and loading of pesticides is exempt from these rules.

For the purpose of this publication, the term **bulk** is used whenever the authors are describing requirements under Colorado Revised Statutes (C.R.S.) 25-8-205.5(3) (b) and its associated rules.

Other state and federal laws also regulate the handling of agricultural chemicals.

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) is administered by EPA and establishes requirements that address storage, mixing and loading/unloading of pesticides. These requirements are stated as part of the pesticide label.

Containment and mixing/loading requirements are based on thresholds of volume and mass stored or mixed and the time the materials are held. They apply equally to commercial, public, and private operations (farms, government, and businesses).

The Colorado Pesticide Act, administered by CDA, requires that pesticide storage, mixing, and disposal be performed as per requirements on the pesticide label.

The Colorado Pesticide Applicator's Act, also administered by CDA, has general requirements for storage of pesticides by commercial applicators.

Table 1. Do the rules for bulk agricultural chemical storage and handling apply to you?

Pesticides		
Do you store pesticides in containers larger than 55 gallons* for liquid pesticides or 100 pounds for dry pesticides for more than 15 consecutive days? *Does not include EPA approved portable refillable containers.	If yes	Secondary Containment & Mixing/Loading area required
Do you store pesticides in containers larger than 660 gallons?	If yes	Secondary Containment & Mixing/Loading area required
Do you mix or load (at one site annually): <ul style="list-style-type: none"> • ≥500 gallons of formulated products of liquid pesticides • ≥3,000 pounds of formulated products of dry pesticides • ≥1,500 pounds of active ingredients of pesticides 	If yes	Mixing/Loading area required
Fertilizers		
Do you store liquid fertilizer in a container or series of interconnected containers with a capacity of greater than 5,000 gallons for a period of 30 consecutive days or more at one site?	If yes	Secondary Containment & Mixing/Loading areas required
Do you store bulk dry fertilizer in quantities of 55,000 pounds or more for a period of 30 consecutive days or more at one site?	If yes	Secondary Containment & Mixing/Loading areas required

The Colorado Hazardous Waste Act and the federal Resource Conservation Recovery Act administered by CDPHE regulate hazardous wastes generated at agricultural chemical handling facilities.

Always check with state and local authorities for regulations governing each site. Federal regulations have jurisdiction in the absence of more stringent state or local regulations.

While larger operations should be aware of these regulations, safety standards apply for operations of all sizes. To maintain the health and safety of the work and natural environment, the BMPs contained herein should be implemented for all sizes and types of pesticide and fertilizer storage and handling facilities.

The BMP Approach

The Colorado General Assembly passed an amendment to the Colorado Water Quality Control Act (C.R.S. 25-8-205.5), in part to promote the voluntary adoption of Best Management Practices (BMPs) to protect groundwater. The act calls for mandatory pesticide and fertilizer containment if certain thresholds are exceeded. Operators of these facilities as well as operators whose facilities are exempted from mandatory containment are both strongly encouraged to voluntarily adopt BMPs for agricultural chemical containment to further reduce the potential for groundwater contamination. BMPs are recommended methods, structures, or practices designed to prevent or reduce water pollution. Voluntary adoption of BMPs will help prevent contamination of water resources, improve public perception of the industry, and perhaps eliminate the need for further regulation and mandatory controls.

Pesticide Label Directions

The EPA is required by FIFRA to specify procedures and standards for container design and the removal of pesticides from containers prior to disposal. Therefore, every pesticide label contains a section on proper storage and disposal procedures. The labeling segment also includes instructions for how to properly clean pesticide containers and a statement identifying the container as either non-refillable or refillable. **Pesticide users are required by law to comply with the instructions on the labels.**

The Storage and Disposal section of the label has instructions on how to:

- Store a product
- Dispose of leftover pesticides
- Clean an empty container (for certain types of pesticides and containers)
- Dispose of an empty container if recycling or reconditioning is not an option

In addition, the Storage and Disposal section of a label may have instructions on how to:

- Dispose of pesticide rinsate (a rinsate is a chemical product diluted with water)
- Return the container for refilling (for sale or distribution), if it can be reused

Figure 2 indicates the subheading and required statements in a pesticide label. Always refer to the specific label you are using for storage and disposal instructions.

Example of Storage and Disposal Information Found on a Pesticide Label

STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage or disposal.

PESTICIDE STORAGE: Do not store under conditions which might adversely affect the container or its ability to function properly. Do not store below temperature of 0° F. If frozen, warm to 40°F, and reconstitute before using by rolling or shaking the container. Store in safe manner. Store in original container only. Keep container tightly closed when not in use. Reduce stacking height where local conditions can affect package strength. Personnel should use clothing and equipment consistent with good pesticide handling.

PESTICIDE DISPOSAL: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

CONTAINER HANDLING

This section will contain detailed information on how to use container types, how to use and dispose of rinsates, when to clean, and how to clean different containers.

Nonrefillable container: Do not reuse this container to hold materials other than pesticides or dilute pesticides (rinsate). After emptying and cleaning, it may be allowable to temporarily hold rinsate or other pesticide-related materials in the container. Contact your state regulatory agency to determine allowable practices in your state. Once cleaned, some agricultural plastic pesticide containers can be taken to a container collection site or picked up for recycling. To find the nearest site, contact your chemical dealer or manufacturer, or contact the Agricultural Container Recycling Council (ACRC) at www.acrecycle.org. If not recycled, then puncture and dispose of in a sanitary landfill, or incineration, or if allowed by state and local authorities, by burning. If burned, stay out of smoke. Triple rinse or pressure rinse container (or equivalent) promptly after emptying.

For packages up to 5 gallons: Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container ¼ full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times.

Pressure rinse as follows: Empty the remaining contents into application equipment or a mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank or collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container, and rinse at about 40 PSI for at least 30 seconds. Drain for 10 seconds after the flow begins to drip.

For help with any spill, leak, fire, or exposure involving this material, call day or night:
CHEMTREC- 1-800-424-9300

Figure 2. An example pesticide label. Refer to the specific label being used. Information provided includes storage and disposal instructions, container types, disposal of rinsates, and how and when to clean containers.

Site Selection

Human and environmental safety should always be considered before locating fertilizer or pesticide facilities. Determine the potential for groundwater contamination at the site by comparing aquifer depth and the permeability of the overlying material. Surface water hazard generally is a function of distance, slope, and runoff at the site. Seek professional help if you are unsure how to meet local codes or evaluate environmental sensitivity.

Existing Sites

Evaluate the existing site to determine its suitability for pesticide and fertilizer storage and handling before building any new facilities. Baseline values for environmental contaminants on the construction site should be determined by testing soil, groundwater, and surface water. If these baseline values are not established and the site is later found to be contaminated, it will be difficult to determine if the contamination was a result of the old site or the new facilities.

New Sites

An environmental assessment may be a valuable tool to consider when deciding where to locate a facility. The assessment will determine baseline information and the suitability of the site. It is intended to detect the presence of contamination, if any, and the level and extent of contamination. If any contamination is found, additional sampling of the soil and groundwater should be conducted to determine the full extent of the contamination.

Consider the new location in relation to water supplies, populated areas, traffic patterns, and potential future development.

Facility Site Plan

When considering the construction of a facility, sketch out a site plan and document:

1. Location of proposed chemical facilities in relation to surrounding property and traffic patterns

2. Soil type, topography, and slope
3. Depth to groundwater, recognizing there may be seasonal fluctuations
4. Depth and location of wells, both on the site and within 100 feet of the property
5. Distance and direction to surface water
6. Plan of construction
7. Proximity to 100-year flood plain
8. Drainage of water across the property during storms
9. Operational plan for containment areas showing the containment strategy, handling of recovered chemicals and rinse water, and handling of precipitation accumulation and waste

Components of the Agricultural Chemical Facility

Storage Facilities for Pesticide and Fertilizers

Storage areas usually include a storage building or warehouse and many times include bulk storage tanks and a fenced yard. Plan your storage facility as a secured, single-use area, separate from other activities and storage (feed, seed, and fuel). Design the storage area to protect pesticides and fertilizers from possible theft, unauthorized use by untrained personnel, and temperature extremes. Certain pesticides may lose effectiveness if frozen or overheated, and the expansion of pesticides caused by temperature extremes can cause containers to crack or break, resulting in potentially hazardous leaks or spills. Excessively high temperatures (120 F or higher) can also change the effectiveness of a pesticide and may produce dangerous fumes, making the storage area unsafe. Federal law requires that concentrated pesticides be stored in a secured area. Therefore,

outdoor storage containers should be located within a permanently fenced area. Be sure to post warning signs indicating that pesticides are stored at the location near each entrance to the storage facility. Figure 3 is an example of a combined storage and mixing facility for pesticides and fertilizers.

In most cases, pesticides and fertilizers should be stored separately to minimize the possibility of cross contamination or creation of hazardous waste in the case of fire or other disaster. Small operations can avoid the need for multiple storage areas by constructing separate containments for pesticides and fertilizers within the same structure. Whenever possible, you should minimize chemical storage to avoid the associated risks. Purchasing only the amount of chemical needed, keeping tight inventory control, and using returnable container systems can help small operators minimize the amount of chemicals stored.

However, even small operations need the insurance of a well-designed and managed facility. The cost of these preventive measures is far less than the potential costs of a cleanup or lawsuit.

Ideal Storage Facilities Should Have:

- Fence
- Warning Signs
- Lockable door
- Emergency numbers posted
- Adequate lighting, ventilation, and fire extinguishers installed
- Concrete or impermeable floor
- Insulation to keep even temperatures

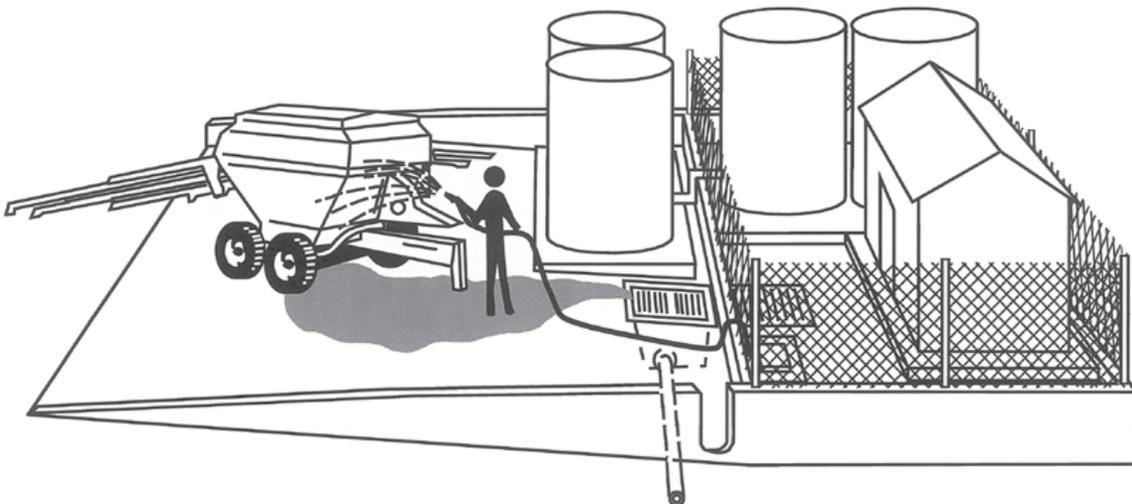


Figure 3. Combined storage and mixing facility.

Liquid Pesticides

Always store pesticide by container size and product in locked buildings with impermeable floors. Herbicides, fungicides, and insecticides should be separated to prevent cross contamination. Dry formulations of insecticides or fungicides can become contaminated if stored with certain volatile herbicides and may cause plant injury when used. Never store liquids below grade or in a basement. Small boxes and jugs should be kept on shelves, while drums and mini-bulks should be kept on floor pallets (Figure 4). Purchasing small volume returnable or EPA approved portable refillable containers will help small operations reduce the problems of storing unused product and minimize container

disposal problems. Additionally, pesticides stored in these containers are exempted from requirements for secondary containment under Colorado rules.

Fluid Fertilizers

Fluid fertilizer should not be stored in an underground or lined pit storage container. Underground tanks are strictly regulated by the USEPA under RCRA and expose operators to unnecessary liability. For most operators, underground storage of any agricultural chemical is a risky choice. Valves on fertilizer storage containers should be locked or otherwise secured (mandatory for bulk storage) except when persons responsible for the facility security are present. Valves on rail cars, nurse tanks, and other

mobile pesticide containers parked overnight at a storage facility also should be locked or secured.

Dry Pesticides and Fertilizers

Stored dry products pose little threat to groundwater as long as they are kept dry. To ensure that precipitation will not compromise the dry chemicals, they should be covered by a roof or tarpaulin and kept on pallets to reduce the possibility of water damage (Figure 4). Treated baits (for rodents, insects, and birds) should not be stored near other chemicals because they can absorb chemical odors and become repellent to the pest, and therefore non-functional.

Pesticide and Fertilizer Storage Checklist

- Pesticide and fertilizer stored in separate containment areas
- Dry products stored above liquid products, or in separate areas
- Inventory of type and quantity of each chemical maintained and Safety Data Sheets (SDS) on site and on file (provide your local fire department with a detailed diagram of all storage locations and facilities)
- Spill clean-up kit on-site
- All containers marked with the date of purchase
- Pesticides kept in their original containers
- Labels legible and attached to containers
- Plastic or metal shelving used (avoid using wood shelving since it may absorb spilled materials)
- Routine inspections of the storage area conducted to check for leaks and spills (maintain a log book to document facility inspections and repairs)
- Personal protective equipment (PPE) kept easily accessible, but not in the pesticide storage area
- Pesticide and fertilizer storage is at least 100 feet from wells.



Figure 4. Storage of pesticides on metal shelves and floor pallets

Secondary Containment for Pesticides and Fertilizers

Secondary containment is essentially a back-up system built around pesticide and fertilizer containers to capture products that may leak or spill and is required for facilities handling bulk amounts. This type of containment protects the environment from accidental leaks and spills of large liquid storage tanks by preventing spills from entering the soil and possibly ground or surface water. Pesticides and fertilizers should be stored in separate containment structures to prevent mixing in case of leaks.

Several strategies can be used for secondary containment of pesticides and fertilizers. Fertilizer containment usually covers a larger area because of the size of the tanks used to store fluid fertilizers. Fertilizers can be contained in a dike constructed of concrete, a synthetic liner system, or a relatively impervious soil (bentonite, attapulgite, natural clay). Pesticides, rinsate, and wastewater may be contained in a

concrete dike or synthetic liner system such as a plastic or fiberglass tub (Figure 5). Clay, clay mixtures, and prefabricated bentonite liners should not be used to contain any bulk pesticide.

Acceptable Containment Methods and Strategies

Pesticides:

1. Minimize volume and duration of pesticides stored on site
2. Double tanks for small volumes
3. Concrete, steel, fiberglass, or plastic floor and walls
4. Concrete curbed areas surrounding small volume container storage
5. Synthetic liners with concrete or composition walls
6. Approved portable synthetic containment units

Fertilizers:

1. Minimize volume and duration of fertilizer stored on site
2. Synthetic liners over a prepared earthen surface
3. Sealed asphalt floors around concrete pads for dry products
4. Earthen dikes of compacted clay or bentonite
5. Dust control boots for dry fertilizer conveyors

Containment Sizing and Design Considerations

Secondary containment facilities for bulk storage should be large enough to hold the entire capacity of the largest storage tank, plus allow additional volume for any other items that may displace storage volume. Rules for Colorado require that the capacity of the containment be 110% of the volume of the largest bulk container when protected from precipitation or

125% of the largest container when unprotected from precipitation. The same may be applied as a rule of thumb for non-bulk containers.

The wall and floor of a secondary containment structure should be impervious to liquids for the life of the structure. Secondary containment structures should support gravity loads of full tanks and should resist weather-related cracking and corrosion. They should be inspected regularly to ensure no damage will

jeopardize functionality. The walls should resist static and hydraulic loads from the equilibrium liquid level. Walls adjacent to large tanks also need to resist dynamic hydraulic loads from liquids gushing from a ruptured tank.

Secondary containment structures should be sloped to a sump so spilled material or precipitation accumulations can be easily collected and removed. Tanks should be elevated or anchored to prevent flotation in the event the containment

area is filled with fluid. Flexible hoses at the pipe-to-tank connection will prevent potential plumbing rupture if a tank floats or shifts. In most cases, help from a professional engineer is needed to design a facility that meets all requirements and design considerations.

Synthetic Liners

A variety of synthetic liners can be used to contain bulk fertilizers and pesticides. However, prior to installation, obtain written confirmation of compatibility, durability, and a written estimate of the life of the liner from the manufacturer. This should be kept at the facility as a permanent record. Synthetic liners should be installed per manufacturer's specifications and under the supervision of a qualified representative of the manufacturer. All seams should be tested, and repaired if necessary, in accordance with the manufacturer's recommendations.

Synthetic liners should be durable and chemically resistant to the stored chemical and the soil in contact with the liner or compatible with the materials being stored within the structure. The synthetic liner should be protected by a six-inch soil layer below the liner and a 12-inch gravel layer above the liner. Soil layers should be free of large rocks, angular stones, sticks, or other materials which may puncture the liner.

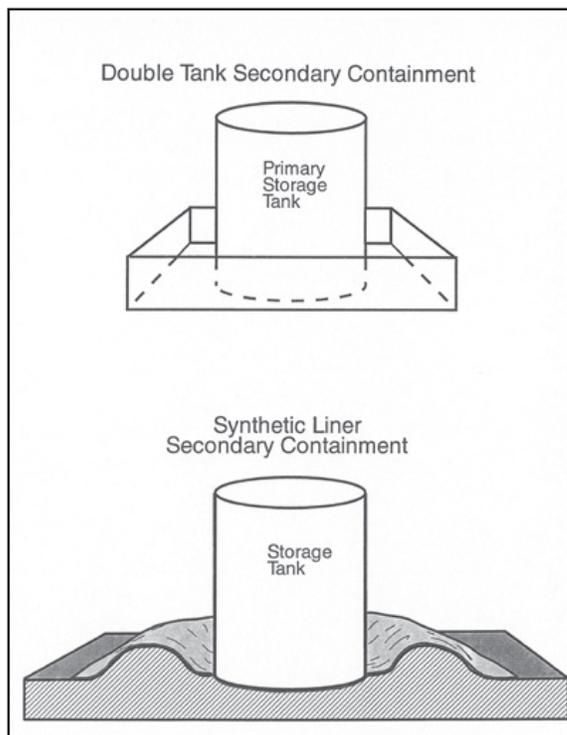


Figure 5. Secondary containment

Secondary Containment Checklist

- Adequate containment exists for stored chemicals
- Containment area cleaned regularly and immediately after any spill or leak
- Regular inspection of containment facility to ensure good repair
- Storm water collected promptly and disposed of, or used for make-up water
- Sump pumps manually operated
- All transfer pumps, pipes, hoses, and valves located above ground for easy inspection
- Containment facility located a safe distance from any water body or at least 100 feet from a water well

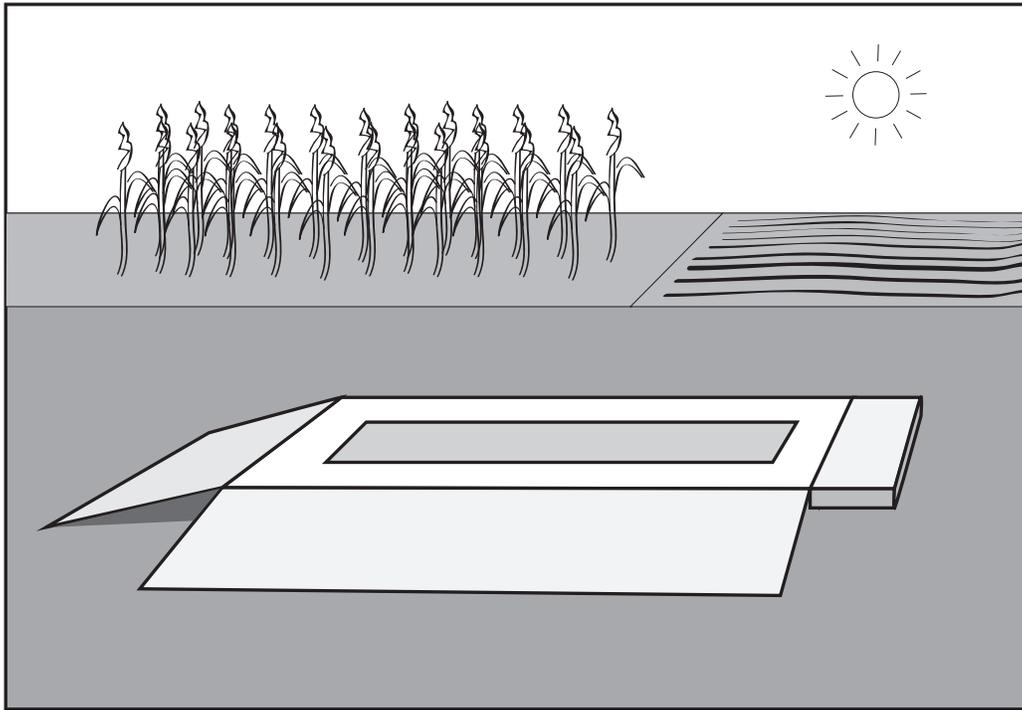


Figure 6. Steel transportable mixing and loading pad

Mixing and Loading Systems

Mixing and loading technologies have significantly improved in recent years. Developments include closed systems and other improvements that increase handler safety, may reduce the need for some personal protective equipment, decrease the occurrence of spills, and provide a more accurate measurement of pesticide concentrate. Closed mixing and loading systems use various mechanical devices to deliver the concentrated pesticide from the container to the equipment directly. Closed systems are most appropriate for liquid pesticides with “Danger” signal words or ‘Minimal Exposure’ pesticides. Water-soluble bags are also a type of closed mixing system, and reduce spills and pesticide exposure. The pesticide bag is placed unopened into the mixing tank and dissolves in water or liquid fertilizer.

Induction bowl sprayer attachments are also a method to minimize spills and exposure during mixing and loading (Figure 7). Hoppers constructed of metal, plastic or

fiberglass attach to the side of the sprayer where concentrated pesticide can be added to the mix tank, and then water carries the pesticide to the spray tank. The primary advantage is that they allow pesticides to be mixed at ground level, eliminating the need for operators to climb on and around machines. This system minimizes exposure when rinsing the empty container and transferring the pesticide and rinsate to the application equipment.

If piped water from a well or public water supply is used to supply mix and wash water, it is essential that backflow prevention devices (Figure 8) and a six-inch air gap between the nose and the tank water level be implemented to prevent contamination of the groundwater supply. Avoid spills while mixing by using a timer or a float to shut water off automatically when the mixing tank is full. A separate nurse tank for water largely eliminates the need for these devices.

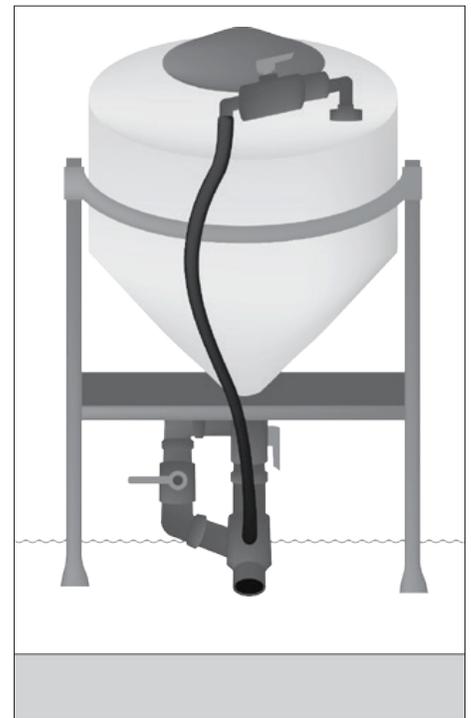
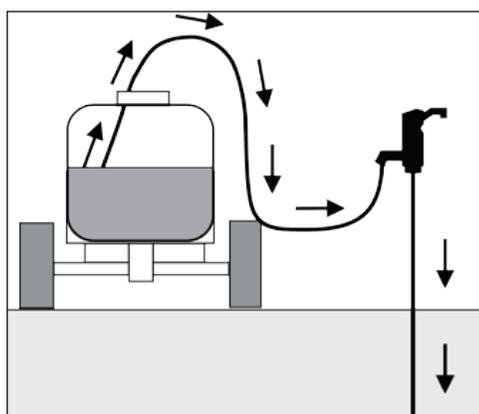


Figure 7. Induction bowls add an element of safety and spill prevention to pesticide sprayers and mixing tanks.

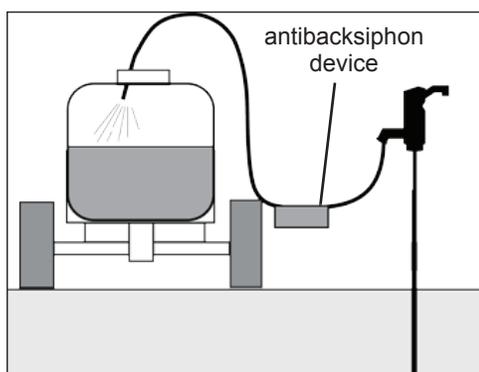
Mixing and Loading Checklist

- Mixing, loading, and equipment cleanup conducted at the application site whenever possible - otherwise, locate mixing area a safe distance away from any surface water or well
- Always mix and load at a minimum of 100 feet from water wells
- Install closed system devices on spray equipment to avoid mixing problems
- Locate mixing area a safe distance from vulnerable environmental sites such as water bodies
- Pads constructed and managed in accordance with federal, state, and local regulations and guidelines
- Rinsate stored in properly labeled containers
- Pad and sump cleaned daily or after each use

Management of Containment Facilities



Avoid backsiphoning into water source



Keep fill hose above water level

Figure 8. Use antbacksiphoning device and keep hose above fluid level in tank

The life of pesticide and fertilizer storage, containment, and mixing facilities can be substantially extended with regular maintenance. Inspect the facility thoroughly on a seasonal basis to stay ahead of maintenance requirements of the facility. Preventive maintenance can minimize factors that cause deterioration and prevent small problems from becoming large ones.

Good housekeeping procedures are also important to prolonging the life of the facility. Clean up pesticide or fertilizer spills promptly to prolong the life of concrete (see “Steps to clean up a spill” on page 14). Keep the sump, pipes, tanks, and fittings clean and free of corrosion. Keep metal fixtures painted and apply a protective surface coating over high-wear concrete and joints. Seal concrete cracks as part of a regular maintenance program. Actively growing cracks indicate a larger problem and should not just be covered up. Determine the cause

of the cracks and take the appropriate steps to correct the situation.

Recordkeeping

A written record of all inspections and maintenance should be made on the day of the inspection or maintenance and should be kept at the facility. Inspection records should contain the name of the person making the inspection, the date of each inspection, conditions noted, and any maintenance performed. The operator should inventory, measure, and record the liquid level in each storage container at least once a month.

Pesticide/Fertilizer Storage and Handling Facility Maintenance Checklist

Routinely inspect and maintain the following:

- Storage tanks (corrosion, mechanical damage, leaks)
- Tank valves and fittings
- Tank supports and anchors
- Containment area drainage
- Emergency and safety equipment
- Concrete joints and sealants
- Concrete floor and wall surfaces
- Sumps and sump pumps
- Protective coatings and paint
- Electrical systems and control
- Sight gauges

Managing Spills and Waste Disposal

Pesticide and fertilizer that collects or is spilled on containment pads must either be land applied at proper rates or must be disposed of as a waste. Due to the costs associated with handling hazardous wastes, efforts should be made to minimize the amount of soil, water, or debris accumulating on the pad, and all chemical spills or rinsate must be recovered immediately. In most cases, spilled chemicals can be land applied or used in the next spray batch.

If chemicals must be disposed of, the Agricultural Chemicals and Groundwater Protection Program has an online application (<http://www.colorado.gov/ag/pw>) that contains county level contact information regarding pesticide waste disposal.

The mixing and loading pad may be used solely to contain incidental spills that occur during chemical handling or it may be used for routine cleaning of equipment in addition to spill containment. Rinsates collected during equipment washing place an additional management demand on operators of these facilities. Sumps

Steps to clean up a spill:

1. Control spilled materials
2. Contain spilled material
3. Clean up spilled material
4. Comply if necessary

should be pumped dry after each cleaning to maintain pad capacity and avoid cross contamination. Rinsate may be applied to fields as fertilizer or pesticide according to the label. However, a more cost-effective method is to store rinsate in dedicated tanks for use as make-up water in the next spray batch. Always avoid incompatible spray mixtures or mixtures of pesticides labeled for different crops. Rinsate tanks should be clearly marked with the type of material they contain, and operators must exercise a high level of management to avoid cross contamination.

Accumulated sediment containing pesticide residues should be removed from the sump before cross contamination with other pesticide occurs. This sludge can be used as a pesticide on a labeled crop or it can be disposed of as waste. For most agricultural pesticides, the contaminated sludge can be mixed with dry fertilizer and applied to cropland in compliance with label conditions. If the pesticide or pesticides in the sludge are unknown, the material cannot be legally applied as a pesticide and must be handled as waste. For this reason, it is important to clean the pad and sump whenever pesticides are changed.

Containers

A dealer, commercial applicator, or farmer who handles pesticides or fertilizers also must contend with the proper disposal of empty containers and other waste. Empty pesticide containers that have been triple rinsed must be properly stored until their disposal (Figure 9). They should not be reused unless the label allows their recycling and a recycling

service is available. Check if your state has an available Ag Container Recycling Council contractor, which can collect and recycle 55 gallon or smaller pesticide containers, at www.ecycle.org. Empty containers that have been properly rinsed may be disposed of in a sanitary landfill if allowed by state and local law. Do not recycle pesticide containers in normal, household recycling programs.

Pesticides Spills

Incidental spills and leaks can be managed in one of two ways. Small spills may be cleaned off the pad using a dry absorbent material such as cat litter and stored in a clean drum for subsequent application or disposal. Larger spills may be washed down with sufficient water to flush the material into the sump. The water in the sump should be pumped out before the end of the work day.

A pesticide spill kit (see sidebar) should be kept on hand at all times, and spills should be cleaned immediately. First, attempt to stop the leak or spill from spreading, then contain the affected area with a dike or absorbent materials, such as soil or cat litter. The material should be swept or shoveled into a sturdy trash container. The remaining pesticide product should be cleaned and neutralized according to the

Safety Data Sheet (SDS) of the particular pesticide. For more specific information, see the factsheet, “What to do with Pesticide Spills,” listed in the References section.

Any spill that meets or exceeds the reportable quantity on the SDS must be reported to the Colorado Department of Public Health and Environment (CDPHE). A spill of any quantity that may enter surface water, groundwater, and dry gullies and storm sewers leading to surface water should also be reported to CDPHE at 1-877-518-5608. Any accidental discharge to the sanitary sewer system must be reported immediately to the local sewer authority and the affected wastewater treatment plant.

Should a pesticide come into contact with a person’s skin or clothing, he or she should take immediate action by leaving the area, removing contaminated clothing, and washing the affected area with water and detergent for at least 15 minutes. In any pesticide contamination incident, follow directions given in the label’s first-aid statements. If the label is not available or if there are further questions, contact the Poison Control Center (800-222-1222).

Spill cleanup kit contents:

- Absorbent material (cat litter, clay, sawdust)
- Trash bags for contaminated waste
- Sturdy trash container with a lid
- Disposable brush and plastic dustpan

The most effective waste management practices reduce the total amount of waste that must be handled. To minimize waste at the agricultural chemical handling site:

- Purchase only the amount of chemical needed for each season
- Return unused chemicals to your dealer in a timely manner to avoid over-winter storage
- Utilize closed mixing and loading systems
- Mix only the precise amount of chemical needed for the immediate job
- Use rinsate as make-up water for the next spray batch; be sure rinsate water is chemically compatible with the pesticide or fertilizer mixed, and that all label restrictions are observed
- Use mini-bulk or portable refillable containers and two-way containers to eliminate container waste
- Mix chemicals and clean equipment at the application site to reduce rinsate water
- Recycle empty pesticide containers whenever possible
- Roof mixing pads and secondary containment structures to reduce stormwater handling problems

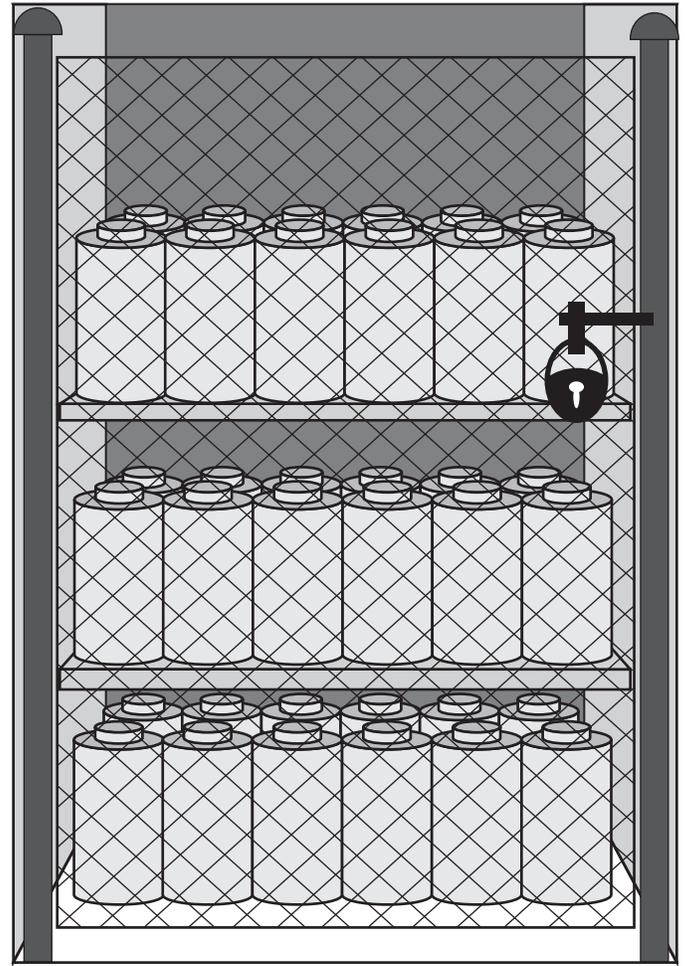


Figure 9. Empty rinsed pesticide containers should be kept in a secure area while awaiting disposal.

Worker Safety

Knowledge of safety procedures is essential for all workers where pesticides and fertilizers are stored and used. Operators using pesticides and fertilizers should provide safety training and equipment. Pesticide labels specify the appropriate protective equipment and clothing to wear. The EPA Worker Protection Standards (40 CFR 170) apply to forest, farm, nursery, and greenhouse operations and should be followed to protect employees from pesticide hazards. To get more information on Worker Protection Standards, visit www.cepep.colostate.edu.

Safety equipment such as emergency showers, eye flush fountains, up-to-date first aid kits, complete spill cleanup kits and a current SDS for the appropriate products should be available near the work area to allow easy access. Be sure to locate all personal protective equipment in a clearly accessible area partitioned from the stored products.

Implementation of safety training programs for new employees, and regular reviews of safety procedures for all employees, is recommended. Inform all workers of the types of

materials they handle, how to handle them safely, and the potential health risks involved. A list of emergency numbers should be available at all times, and an emergency response plan should be developed to deal with any incident that may take place.

Emergency Response Plan

The operator of a pesticide or fertilizer storage facility should prepare a written emergency and discharge response plan for the storage facility. The operator should keep the plan current at all times. A copy of the plan should be kept at a prominent location at the storage facility and, if applicable, at the nearest local office from which the storage facility is administered. The plan should be made available for employee use and for inspection. Operators of storage facilities should provide a copy of the plan and a current chemical inventory to the local fire department.

The plan should include:

1. The identity and telephone numbers of the persons or agencies who are to be

contacted in the event of a discharge, including persons responsible for the stored chemical.

2. The procedures and equipment to be used in controlling and recovering or otherwise responding to an emergency or discharge.
3. For each chemical stored at the facility, a complete copy of the storage container labeling.
4. The identification and location of every fixed storage container located at the facility.

Persons employed at the storage facility should be trained in discharge response procedures outlined in the

emergency and discharge response plan. New employees should receive training and should not participate in emergency responses until such training is completed.

Agricultural hazardous waste releases that could potentially threaten public safety should be reported within 15 minutes to:

1. Local authorities (911)
2. CDPHE hazardous spill reporting hotline

Important Phone Numbers

Colorado Department of Agriculture Pesticide Section	(303) 869-9051
Colorado Department of Agriculture Groundwater Program	(303) 869-9043
Colorado Department of Public Health and Environment Reporting Line	(877) 518-5608
Colorado State University Extension Pesticide Education	(970) 491-3947
EPA Region VIII Pesticide Office	(800) 227-8917
EPA National Response Center	(800) 424-8802
CHEMTREC Emergency Hotline	(800) 424-9300
Poison Control Center	(800) 222-1222
Local police, fire, or sheriff	911 (usually)

Best Management Practices Summary

Guidance Principle: Construct facilities for pesticide and fertilizer storage, mixing, and loading to protect surface and groundwater from contamination due to spills or leaks.

Determine whether compliance with Colorado rules regarding agricultural chemical storage and containment is required due to volume of product used (see Table 1). Select BMPs that achieve the above guidance principle and are feasible for your operation.

Consider:

- Current chemical storage and mixing practices
- Potential hazard of the mixing or storage site
- Overall costs and benefits of BMPs

General BMPs

1. Follow all label directions for storing and mixing of agricultural chemicals, for disposing of leftover product, and cleaning and disposing of empty containers.
2. Keep accurate pesticide and fertilizer use records. Maintain a log book to document storage facility inspection and maintenance.

Site Selection BMPs

3. Assess the storage site and the loading areas to determine appropriateness of the site in terms of human safety and ground and surface water sensitivity.

Chemical Storage BMPs

4. Store all agricultural chemicals in a locked, well-marked building with impermeable floors, located a safe distance from any water source (minimum of 100 feet from water and 50 feet from any other building is suggested).
5. Store pesticides in their original containers with labels intact, visible, and legible.
6. Store products by type and size. Keep pesticides and fertilizers in separate containments. Store small volume containers on metal shelving with a retainer lip at the front of each shelf.
7. Keep a spill kit, an inventory of the pesticides, and a copy of the label and SDS for each pesticide in the storage area.

Secondary Containment for Liquids BMPs

8. Equip bulk pesticide and fertilizer storage facilities with secondary containment dikes designed to contain liquid spills or leaks. Recover any spill in the storage area immediately and reuse or dispose of appropriately.
9. Construct secondary containment systems out of chemical-resistant, impermeable material. Do not use exposed earthen berms for secondary containment of pesticides.

Mixing and Loading BMPs

10. Mix and load at the application site (in the field) whenever possible.
11. Construct impermeable mixing/loading areas at permanent bulk pesticide loading sites. Design areas to handle traffic loads of the largest vehicle to be used, plus the spray load. Consider roofing or enclosing the pad to reduce stormwater accumulation.
12. Locate permanent and field mixing areas a minimum of 100 feet, or the necessary safe distance, from any water source or well.
13. Install backflow prevention devices on supply lines and be sure hoses are kept above the fluid level when using hoses connected to a water supply. Using nurse tanks for water supplies ensures protection from backflow.

14. Recover any spill at the mixing site immediately and reuse. Do not let spilled chemical soak into the soil. Keep granular absorbent material available at the mixing site to clean up small spills.
15. Clean loading pads and sumps after daily use. Do not allow fertilizers or pesticides to accumulate in the sump. Keep the sump covered when not in use to keep out trash, dirt, and debris.

Waste Management BMPs

16. Mix only the amount of pesticide that will be used for the current job.
17. Use products by age so that older product gets used first. If containers are deteriorating, use the product as soon as possible or contact your ag chemical dealer.
18. Purchase the correct amount of product needed and return unopened containers for credit. Whenever available, use Portable Refillable Containers, mini-bulks or small-volume refillable containers to avoid container waste.
19. Recover rinsates and wash water from the mixing pad for reuse as make-up water or apply to the field as a dilute solution in accordance with the label directions.
20. Clean spray tanks and spray equipment at the application site. Take care to rinse equipment in areas where water will not run off toward wells or surface water.
21. Triple rinse or pressure rinse one-way pesticide containers immediately after emptying. Rinse container caps and the outside of containers to remove pesticide residues. Puncture containers prior to disposal.
22. Recycle empty pesticide containers in an approved container recycling program (not mainstream recycling) whenever possible. Do not burn or dispose of containers on-farm.

Worker Safety BMPs

23. Provide worker safety features such as gloves, showers, protective clothing, fire extinguishers, and spill clean-up kits. Keep a copy of the label and material Safety Data Sheets (SDS) available at the mixing station.
24. Train all employees in proper pesticide handling and safety procedures. Employees should have a clear understanding of your operation's emergency response plan in case of any spill or fire. Emergency response plans should include records of products stored and provisions for notification of the proper local authorities.

References

Colorado Department of Agriculture. Agricultural Chemicals and Groundwater Protection Program. Pesticide Waste Disposal for each county. Google Map available at: <http://www.colorado.gov/ag/pw>

Colorado Revised Statutes (C.R.S.) 25-8-205.5. Pollution from Agricultural Chemicals. Law pertaining to groundwater protection that includes provisions for bulk agrichemical storage and mixing/loading.

Emergency Planning for the Farm. Extension Bulletin E-2575 Michigan State University Extension. 2006 . Available at: <http://web2.msue.msu.edu/bulletins/Bulletin/PDF/E2575.pdf>

EPA. Label Review Manual. Chapter 13: Storage and Disposal. 2012. Available at: <http://www.epa.gov/oppfead1/labeling/lrm/chap-13.pdf>

National Pesticide Applicator Certification Manual. Chapter 11: Pesticide Application Procedures. Available at: <http://www.ag.utah.gov/documents/CoreManual.pdf>

On-Farm Agrichemical Handling Facilities. NRAES-78. For sale at: <http://extension.missouri.edu/p/NRAES78>

Plans for Small to Medium-sized Agricultural Chemical Bulk Storage & Mix/Load Facilities. Agricultural Chemicals Groundwater Protection Program. Colorado Department of Agriculture. 2007. Available at: <http://cospl.coalliance.org/fedora/repository/co:3092>

Proper Pesticide Storage. Factsheet # 115. Colorado Environmental Pesticide Education Program. 2006 Available at: <http://www.cepep.colostate.edu/Fact%20Sheets/115ProperStorage.pdf>

Water Quality Control Concerning Agricultural Chemicals and Groundwater (8 CCR 1206-1). Rules pertaining to the storage and mixing/loading of fertilizer and pesticide. Colorado Department of Agriculture 2011. Available at: <https://www.colorado.gov/pacific/agmain/rules-regulations-1>

What to do with Pesticide Spills. Factsheet # 110. Colorado Environmental Pesticide Education Program. 2006. Available at: <http://www.cepep.colostate.edu/Fact%20Sheets/110PesticideSpills.pdf>

USDA Natural Resources Conservation Service. Agrichemical handling Facility Conservation Practice Standard No. 309. 2009. Available from local USDA/NRCS Service Center.

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and Handling*