

# CHEMICAL STORAGE FACILITIES

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**As** a Landscape Contractor, you must deal with the usage and storage chemicals on a regular basis. With several cases each year of groundwater contamination, along with many incidents of accidental human contact due to improperly housed pesticides, having suitable chemicals storage not only makes good environmental sense, but also covers you legally.

Since these accidents cause human suffering and economic losses, chemical storage practices have been targeted by federal and state legislation across the United States. These laws have also forced manufacturers to label appropriate storage environments for their products.

To satisfy regulations, applicators are encouraged to follow all labels on chemicals used, and construct safe chemical storage facilities with secondary containment. By having well-managed and designed facilities, exposure to workers and the public is reduced and your liabilities decrease.

### Causes of Contamination

Groundwater contamination and worker exposure can occur by:

- 1) Unsafe storage practices,
- 2) Large accidental spills,
- 3) Periodic un-recovered spillage of small amounts of pesticides,
- 4) Inadequate cleaning of spray equipment,
- 5) Leaking equipment parked on site,

- 6) Improper disposal of excess spray solutions or rinsates and
- 7) Improper disposal of containers and other "waste" materials.

### What is Chemical Storage?

Chemical storage buildings are designed to store hazardous materials in safe, segregated and secure areas, and to prevent chemicals from leaking out into the environment in case of a spill. Usually these buildings are prefabricated (as opposed to being site-built) and provide secondary containment to achieve compliance with U.S. Regulatory agencies like EPA, OSHA, etc.

The term secondary containment refers to the sump area in the bottom of the building that catches spills and prevents them from escaping. The sump is what differentiates the chemical storage building from other storage buildings, and is usually a 6-inch or 7-inch



**ABOVE:** The interior of a concrete chemical storage building designed for wet storage. One feature of this type of building is the galvanized or fiberglass floor grating raised six inches above the floor, which is designed to contain liquid spills.

## Maintenance Details

**300:** Feet, the minimum distance from drinking water wells and sink holes that have direct access to groundwater should be from pesticide storage facilities.

Source: Alabama Cooperative Extension System

**100:** Degrees, Fahrenheit. Stored chemicals should be kept in buildings with temperatures below 100 degrees. Additionally, chemicals should not be allowed to freeze.

Source: Cornell University

**Chemical storage buildings should be located at least 300 feet from any well. The same buffer zone should be maintained between the facilities and any surface water such as ditches, ponds or streams.**



**LEFT:** Fire detectors and fire fighting equipment should be readily available and a telephone should be convenient, with all emergency numbers posted. Some Precast concrete buildings like this one come with a fire suppression system appropriate for HAZMAT environments already installed.

for partitions within one building) can be established.

### Secondary Containment

The purpose of secondary containment is to contain, recover and reuse spills and rinsate. It is a form of insurance, providing environmental safety by preventing spills from entering the soil, surface water and groundwater. Secondary containment also reduces legal liability of the owner and associated costs of cleaning up a contaminated site.

Secondary containment should be used in the chemical storage area to contain liquid product spills. It prevents spills from entering into storm drains, surface water and/or leaching through the soil.

This prevents groundwater contamination, which may affect human health and the environment.

Several alternatives are available for secondary containment. Evaluate the characteristics, benefits, limits, performance and management aspects of each alternative. Talk to consultants, engineers and manufacturers for detailed plans and specifications for the selected alternative. Secondary containment systems must conform to local, state and federal regulations. Containment walls or curbs are used to contain the spilled or leaking product.

### Design Considerations

Concrete is a popular material for construction of secondary containment floors and walls. It is easy to clean and does not easily absorb chemicals. The floor must be designed to withstand the loads from the equipment and containers. Watertight design specifications and low permeability allow concrete to be easily cleaned and decontaminated.

A 4- to 6-inch high concrete retaining wall around the perimeter is needed to contain spills. Proper jointing practices and use of steel reinforcement can control and reduce the amount of concrete cracking. The wall-to-floor joint must

**RIGHT:** Looking at the inside of a prefabricated concrete chemical storage facility, the curbing design found on the floor ensures any spills are contained within the building, and then are filtered to a secondary containment area.

be watertight and may contain a flexible water stop (Figure 2). If cracks appear, use flexible, chemically resistant sealants to seal cracks. Consult engineers and contractors for proper design information.

### Plumbing Components and Seals

Pesticide formulations often contain solvents and surfactants. Some may cause seal and gasket materials to swell, shrink, soften or dissolve over time with continuous contact. Use chemically resistant materials, such as Teflon, for seals or gaskets. NOTE: Teflon may be incompatible with some pesticides, such as Prowl and Treflan.

Hoses also should be compatible with the pesticides being handled. Hoses manufactured with an inside layer of a cross-linked high-density polyethylene material usually are chemically compatible. Mark or color-code individually dedicated hoses by the pesticide handled for transfer of rinsates into and out of each individual rinsate holding tank. Do not rigidly manifold pesticide rinsate transfer pumps directly to the inlets or outlets of rinsate storage tanks. Use detachable hoses instead of hard plumbing to isolate tanks from other plumbing. Permanent pipe manifolds may allow rinsate from one tank to accidentally mix with rinsate from other tanks in the collecting manifold. Use reinforced hoses on the suction side of the pump.

Use corrosion-resistant valves made from stainless steel, polypropylene or Kevlar. Minimize the number of valves to operate the system to reduce cost and potential leaks. Mount them in easy-to-reach locations for operator convenience.

deep steel well designed to collect liquids through the steel grate flooring.

### Types of Storage

Both pre-designed and custom-engineered storage options are available to properly protect chemicals. Options included heating and air conditioning, fire suppression systems, alarms, interior and exterior lights, floor grates, industrial grade sump shelving and custom door systems. These structures also come with a wide selection of colors to match existing structures.

There are two main types of buildings to consider: Fire Rated and Non-Fire Rated steel buildings. When choosing, identify the materials to be stored and then group them by hazard. A good preliminary step is to refer to the appropriate Material Safety Data Sheets that are required by OSHA, and get in touch with your local fire marshal.

Flammables and combustibles may require a fire rating if located closer than 75' to an occupied facility and/or property line. NFPA designates a 2 Hour Fire Rating for flammable/combustible storage located at distances of 10' - 75' from the above-mentioned areas. A 4-Hour Fire Rating is required if located closer than 10', as well as inside a facility. The Code of Federal Regulations can give you a more detailed site specific analysis. After you identify your hazardous materials to be stored, the substance compatibility should then be determined so that the number of buildings (or the need





**ABOVE:** Like many precast concrete chemical storage buildings, this shed was delivered, constructed, and set up in one day at a site in Pennsylvania.

Use quick shutoff ball valves or plug valves. Provide lockable shutoff valves on outlets of all storage tanks for security.

### Facility Planning

When planning to build or retrofit a pesticide storage facility consider security, as well as present and future storage operations. Take into account personnel and environmental safety and state and federal regulations.

The facility should be reasonably fireproof and well-ventilated. Ventilation rates should be enough to remove chemical vapors. For natural ventilation, provide a minimum of two 8-inch by 8-inch vents located on opposite sides of the storage room and 12 inches above the floor. Mechanical ventilation should be a minimum of 150 CFM. For larger buildings (greater than 1,000 ft<sup>3</sup>) design for six air exchanges per hour. When the area is unoccupied, use one air exchange per hour as a design criteria.

The buildings should be well-suited for both wet and dry hazardous chemical storage, including sprays, paint, thinners, oils, solvents, greases, insecticides, algacides, fertilizers, weed killers.

Temperatures should be kept between freezing and 100 degrees F. Use electric heaters that are UL listed for Class I haz-

ardous locations, or provide warmth by hot water. Never use or allow open flames in storage or handling areas. Electrical fixtures should be dust and explosion proof.

Provide adequate space to securely store empty pesticide containers until you can properly dispose of them.

Include a drainage system containing a sump to collect spills. Treat this material as surplus pesticide and dispose of it properly, according to label instructions.

Chemical storage buildings should be located at least 100 feet from any well. The same buffer zone should be maintained between the facilities and any surface water such as ditches, ponds or streams.

When feasible, storage should be downwind and downhill from sensitive areas, such as homes, play areas, animal shelters, gardens and ground-water sources. Also, the area should not be located in an area subject to flooding.

### Safety Considerations

Equip the storage area with personal protective equipment and materials to handle accidents and spills. Activated charcoal, absorptive clay, vermiculite, clay-granule type cat litter or sawdust are all good materials to absorb liquid spills.

The chemical storage area must be posted with signs at least 50 feet from and around the entrance stating such things as "DANGER: PESTICIDES," "KEEP OUT," and "NO SMOKING AREA." Access to this facility must be limited to only a few individuals.

Never store pesticides where other products can become contaminated, and store dry pesticides on the top shelves while keeping liquids on the lower shelves. Always store chemicals in the original, labeled container, making sure they're tightly sealed.

Maintain a current inventory of all materials in storage, along with a label of all materials, in a secure area away from the storage area. Date and identify all pesticides when they are placed into storage, and store no more than will be needed for one season. Establish a policy of first-in, first-used, so that pesticides do not become outdated. Provide the local fire department with an updated copy of this inventory.

The EPA, NFPA and building codes all list requirements for the proper storage of hazardous materials, and our buildings are FM (FM Global) approved to meet all applicable requirements. However, your local Fire Marshal and/or Building Inspector will be the final say in what is permitted in your situation. **LCN**



**RIGHT:** This illustrated how hazardous materials should be shelved inside a chemical storage unit. Notice that the larger containers are closer to the floor, with smaller bottles on the top shelves. Also notice the drain on the floor that leads to secondary containment in case of a spill.