

## **PREVENTING GROUNDWATER POLLUTION: SECONDARY CONTAINMENT**

### **PREVENTING GROUNDWATER POLLUTION IS EVERYONE'S JOB!**

Even if our drinking water comes from rivers, lakes, or reservoirs, we need to be mindful of the things we do that may pollute groundwater. The groundwater beneath us may feed springs or wells being used for someone else's water supply, whether close by or at a great distance.

### **THE GROUNDWATER PROTECTION PLAN REGULATION HELPS US PREVENT GROUNDWATER POLLUTION**

Once polluted, groundwater is very difficult and expensive to clean up. It is always best to **prevent** groundwater pollution in the first place. That is the purpose of 401 KAR 5:037, the Groundwater Protection Plan Regulation. Section 2 of this regulation lists the activities that require a Groundwater Protection Plan (GPP). Should any of those activities, including use of aboveground (AST) tanks for storage of substances identified as pollutants, occur at your facility, you must develop a GPP. The GPP must state practices that will be used to prevent the pollution. Secondary containment is a very good preventative practice.

### **PURPOSE OF THIS FACT SHEET**

This fact sheet is designed to address one type of practice for preventing groundwater pollution: aboveground secondary containment. While primary containment, such as a drum or tank, holds the material, secondary containment (a second tank, liner, or berm) assures that leaks or spills do not leave the site or adversely impact soils, groundwater, nearby lakes or streams.

### **PATHWAYS TO THE ENVIRONMENT**

Hazardous substances and polluting materials may reach groundwater through a variety of pathways, such as:

- Tank leaks/spills/overfills
- Floor drains
- Loading/off loading areas
- Metallic chip dumpsters
- On-site septic systems
- Floor cracks/cracked containment vaults
- Seepage through building walls and doorways
- Surface runoff
- Equipment storage
- Improperly sealed floors and walls
- Buried tanks/lines
- Exhaust fans (with condensation and drips)

The purpose of secondary containment is to block or trap leaks and spills of hazardous substances and polluting materials from contacting the soil and ultimately reaching groundwater.

## MEASURES AND METHODS FOR SECONDARY CONTAINMENT

### A. Outdoor Secondary Containment Structures (See Illustrations, pages 5 – 10)

Size, function, safety, and accessibility are basic considerations in the design of outdoor containment structures. To assure that the containment structure serves the purpose of preventing leaks and spills, the following guidelines should be followed:

1. The structure should be structurally designed to prevent collapse or deterioration.
2. The containment construction material should be compatible with the material stored to prevent deterioration of the secondary container.
3. The containment structure configuration should be arranged to prevent leaks from containers or tanks from running off or squirting over the walls to the outside of the containment area.
4. The volume of the containment area should be large enough to meet specific regulatory requirements. For outdoor containment, the area must be large enough to hold 100% of the volume of the tank plus 10% for precipitation, unless the containment is constructed to prevent entry of precipitation.

Additional factors to consider:

- **Sealing materials**-Hazardous substances can seep through cracks and joints unless effective sealants or liners are used.
- **Rainwater removal and drainage from secondary containment structures**-Gravity drains (including floor drains and drains with valves) SHOULD NOT be constructed in any structure intended for hazardous substances storage. Employees are likely to leave valves open to let out rainwater. Unfortunately, open valves allow hazardous substances as well as rainwater, to reach soils and groundwater.
- **Method for removing accumulated rainwater and snowmelt**-Many businesses use vacuum pumps to remove accumulated rainwater and snow melt. A manual sump pump designed into the structure is a second option. Manual sump pumps should be used for rainwater removal since they allow for the visual inspection of water before discharge.
- **Weather protection**-Polebarn construction or a metal shed (available at local discount Stores) is often useful, provided that a berm or curb is added to trap leaks and spills.
- **Access for loading/unloading**-Ramps may be needed for dollies or forklifts.
- **Squirt factor**-Make sure that accidental puncture of a drum containing hazardous substances will not squirt beyond the perimeter of the secondary containment storage area. Obviously, the storage area must be large enough to allow for drum or tank placement away from the edge of the area. Double stacking of drums at the edge of the secondary containment storage area should always be avoided.

The services of a contractor or engineer may be needed to design effective secondary containment structures, especially when the physical strength or reinforcement of the structure is a concern. For businesses with only several drums of hazardous substances, it is usually not necessary to engage contractors or engineers. Prefabricated sheds or reinforced poured concrete with coatings can be readily installed at a moderate cost.

### **Construction Materials and Coatings**

A secondary containment structure that cracks or leaks after it is constructed obviously will not serve its intended purpose. Advance planning and common-sense can help avoid structural problems. Also, technical knowledge of the material being stored and construction materials is essential.

#### **General Guidelines:**

- The containment base should be free of cracks and gaps and sufficiently impervious to contain leaks, spills, and accumulated precipitation.
- The base of the containment area should be appropriately sloped (or small enough) to allow removal of liquids or precipitation. You may wish to use a manual sump or collection area to allow the timely removal of spilled material. Gravity drains are not acceptable since they can easily become a direct pathway to the environment.
- Runoff into and from the containment area should be prevented.
- If hazardous substances and polluting materials are incompatible with each other (i.e., likely to cause extreme hazards, fire, or explosion potential if they are mixed), the various containers should be separated from each other with a dike, wall, or berm.

#### **Construction Materials:**

State and federal laws and regulations require the prevention of leaks and spills through secondary containment, but do not specify the type of materials to be used for constructing containment structures. The Groundwater Branch strongly recommends poured concrete, concrete block, and welded metal. Unlined compacted dirt or clay is considered inadequate for petroleum products, as they will seep through the dirt (clay) and pollute groundwater.

Advantages of using poured concrete for secondary containment are:

- Limited porosity compared to concrete block
- One-piece construction
- Low maintenance
- Effective for both low and high volume storage because of structural strength

Disadvantages of poured concrete:

- May not be compatible with certain acid or corrosive substances

- High cost
- May crack
- Expansion joints needed
- Joints need to contain water-stop or sealant

Advantages of cement block structures:

- Low cost; self-installation possible
- May be only alternative for areas where poured concrete is not feasible
- May be effective for low-volume storage areas (i.e., several 55-gallon drums)
- Adequate for interior of buildings in selected locations

Disadvantages of cement block structures:

- Will easily crack, creating constant maintenance problems
- Too porous, unless proper sealant or liner is used
- Low resistance to impact—likely to crack and leak
- Not as strong as poured concrete structures
- Doesn't weather well
- Expansion joints are necessary to prevent cracks between sections of concrete
- Still requires a poured concrete floor

Concrete block has been found by many government inspectors to be totally inadequate as outdoor containment. However, concrete block is generally suitable for storage of small amounts (5 to 10 drums) of hazardous substances indoors. Either poured concrete or metal construction, NOT block construction, is strongly recommended for effective bulk storage of fuels or chemicals.

Welded metal containers provide excellent secondary containment. Metal containers may be prefabricated or made by the business. Fiberglass and other plastics which are chemically-resistant to the hazardous substances being stored are an additional option for secondary containment structures.

### **Sealants and Liners**

Sealants and liners may be essential for assuring that secondary containment structures do not leak through joints and for assuring that seepage through the floor does not occur. Sealants or liners should **always** be used when using concrete block construction.

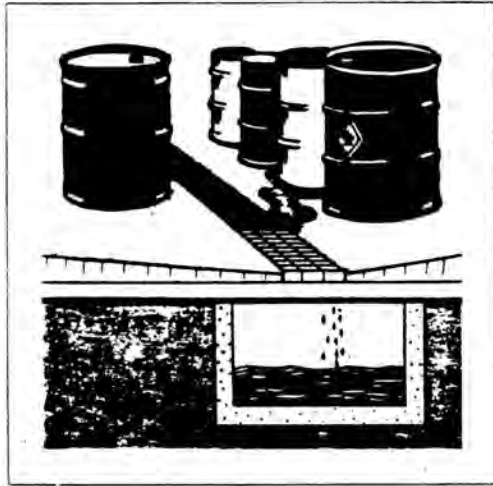
The following factors should be considered when selecting a sealant or liner:

- Chemical compatibility/permeation rates
- Resistance to sun, heat/cold; and other weather conditions
- Manufacturer's warranty for structural strength and resistance to impact
- Methods for repairing coating or lining
- Thermal shock from hot substances

Caulking of all joints is recommended for metal and concrete.

**Information Source:** Small Business Guide to Secondary Containment, Clinton River Watershed Council, Utica, Michigan.

# CONTAINMENT OF LEAKS AND SPILLS IN HAZARDOUS SUBSTANCE USE AREAS



## *Blind Trench Drain:*

- Trench drain closed to prevent hazardous substances from reaching sewer, septic system, dry well, or the environment
- Periodic pumpout by a licensed industrial or hazardous waste hauler



## *Drip Pan Under Spigot:*

- Spigot under tank used to catch drips in high-use area
- Extra care used in areas where portable containers are filled with oil or chemicals
- Cleanup responsibility assigned to one person



## *Loading/Offloading Area for Hazardous Substances and Polluting Materials:*

- Truck well provides secondary containment
- Extra diking provided, if needed
- No drains in truck well; excess water removed with manual sump pump

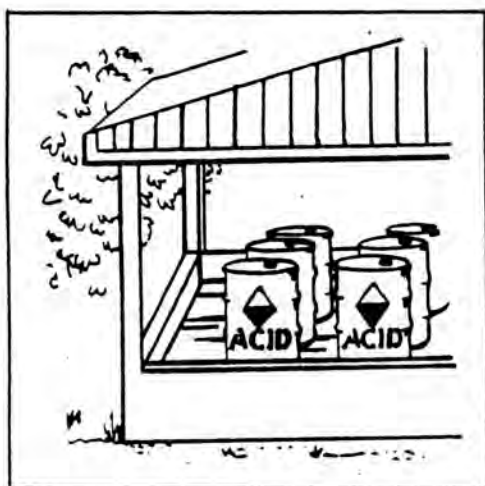
Source of illustrations: Waste Systems Institute of Michigan, Inc.

## OUTDOOR SHED FOR SECONDARY CONTAINMENT



### *Metal Shed:*

- Metal shed from discount store shelters drums from rain and snow.
- Shed anchored to withstand wind.
- Shed construction allows flow of air to avoid buildup of fumes.
- Concrete base and curb in the shed provides secondary containment.
- Ramp provides easy access for loading dolly and drums.

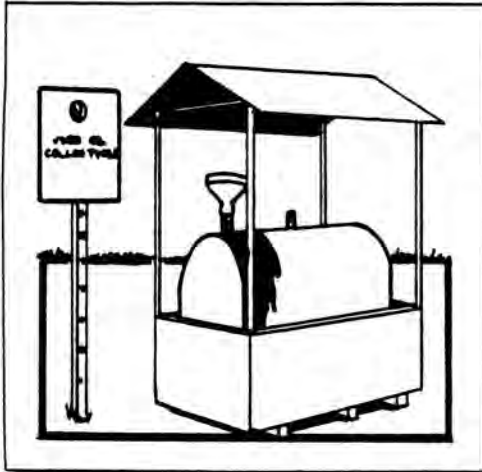


### *Pole Shed:*

- Pole shed with dike provides secondary containment.
- Drums properly placed away from the edge of the dike.
- Roof provides some shelter from rain and snow.
- Water vacuum used to remove rainwater.

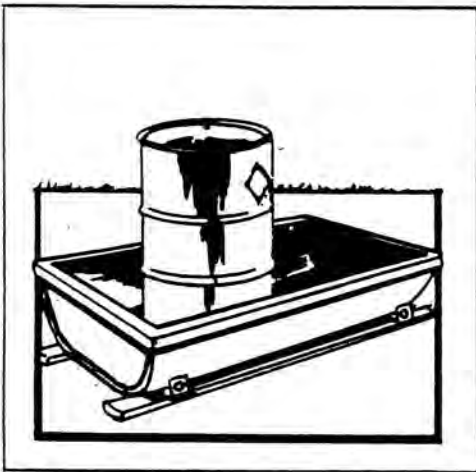
*Note: Before constructing an outdoor shed, setback and storage requirements for particular types and quantities of hazardous substances should be checked with local building and fire protection officials.*

## FABRICATED METAL FOR SECONDARY CONTAINMENT



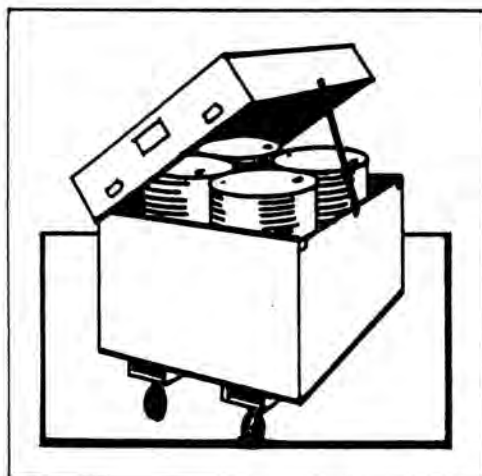
### *Used Oil Collection Tank:*

- Metal containment area catches leaks and spills from 55 gallon tank
- Roof keeps out precipitation, while avoiding buildup of fumes
- Structure set back from buildings for safety purposes



### *Small Containment Area:*

- Scrap metal (from empty tank) used to make secondary containment unit
- Manual sump pump (or water vacuum) used to remove excess rainwater



### *Portable Secondary Containment:*

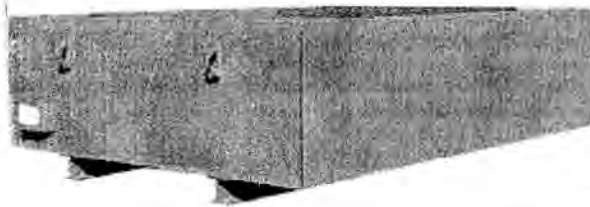
- Welded metal with sealed joints
- Lid closes for safety when not in use
- Wheels allow for easy mobility
- Can be purchased or fabricated to meet special needs

# DIKE TANKS, SHELTER TANKS AND ABOVEGROUND FUELING SYSTEMS

The following examples were obtained from the internet and are a small offering of what is available from tank manufacturers. The photos in this section of the fact sheet were chosen for best illustrating the overall structure of a particular type of tank. Names of the manufacturers of the various tanks are included solely because they were the manufacturers. The Groundwater Branch does not recommend any one brand of tank and advises you to contact the manufacturer to obtain the information necessary to select the right tank for your needs. The web page, mailing, or e-mail address is included for each tank so that you may contact the manufacturer for that information. You are urged to search the internet for additional manufacturers. Visit facilities in your community you see using various types of secondary containment, or you may wish to contact an environmental consultant for advice. These sources may be able to refer you to a manufacturer to contact or assist you in obtaining the proper secondary containment.

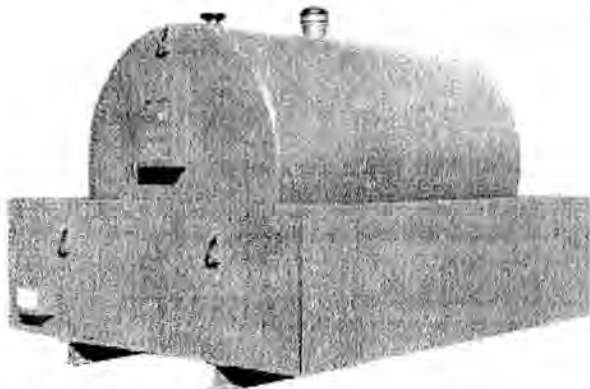
Before purchasing or constructing any type of secondary containment, be sure to contact local building and fire protection officials. You will want to be sure that the construction, setback distances, and storage requirements for particular kinds and quantities of hazardous/polluting substances conforms to local ordinances and codes. If you have questions about the groundwater protection capabilities of a type of secondary containment, contact the Groundwater Branch at 502/564-3410.

## **dike tank only**



"A dike tank can further your investment in your existing single-wall tanks by providing you with an economical means of obtaining a secondary containment solution. Commonly used for everything from fuel and oil storage to water and backup generator systems, dike tanks are an alternative to dual-wall above-ground storage tanks."

## **tank & dike**



"Single-wall aboveground dike tanks can be designed to a widely accepted manufacturers standard specification or can carry the label of, be built to and tested in accordance with the rigorous Underwriter's Laboratories 142 specification for Aboveground Storage of Flammable and Combustible Liquids. Commonly used for everything from fuel and oil storage to water and backup generator systems, dike tanks are an alternative to dual-wall aboveground storage tanks."

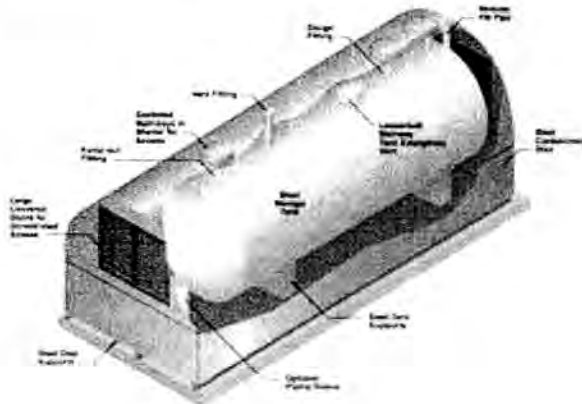
Newberry Tanks  
West Memphis AR  
800/643-9395  
<http://www.newberrytanks.com>





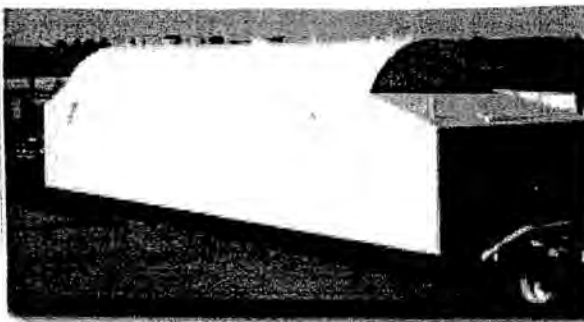
Highland Tank & Manufacturing  
 Company, Inc. Headquarters  
 1 Highland Road, Stoystown PA  
 15563. Tel.: 814/893-5701  
<http://www.highlandtank.com>

"Highland Dike Tanks are ideal for the secure storage of petroleum, chemicals, hazardous waste, and fertilizers. Available in single or multi-tank modules, Highland Dike Tanks are quick and easy to install or relocate. dike Tanks are UL-142 labeled and meet NFPA 30 codes for secondary containment."

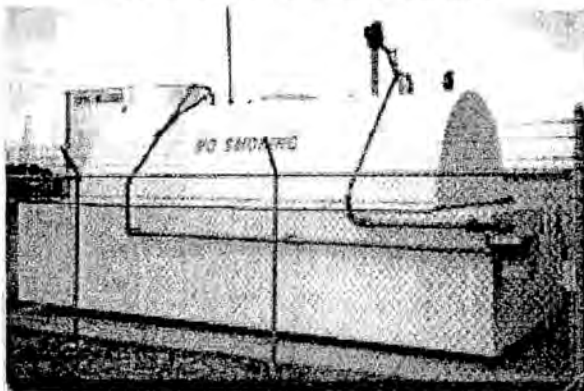


"A highly versatile solution for aboveground storage with complete containment, Shelter Tanks are ideal for the secure storage of petroleum, chemicals, hazardous wastes and fertilizers. Shelter Tanks are a modular aboveground storage system consisting of a carbon or stainless steel tank housed within a 110% or 150% steel containment dike with shelter cover. The Shelter Tank is UL-142 labeled, meets the NFPA 30 code and installs easily."

Dunn Industries, Inc.  
 6 Peninsula Drive  
 Northeast MD 21901  
 Tel. 800/253-8265  
<http://www.dunntanks.com>



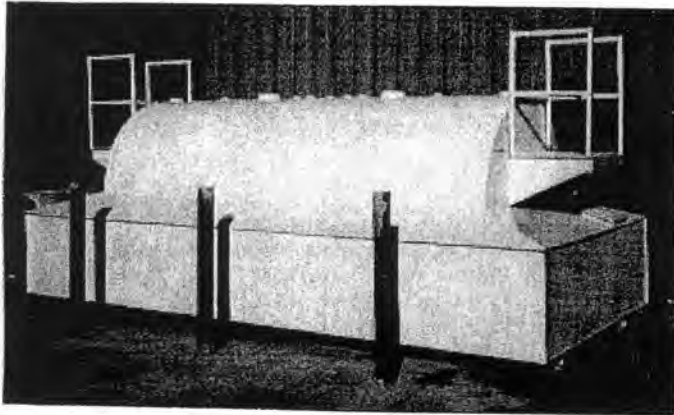
*12,000 Gallon Dike Tank  
 Welded Rain Shields, Fort Knox*



"Dunn Industries offers an economic solution to aboveground tank storage and dispensing requirements. Available in sizes from 100 to 20,000 gallons, Dike Tanks are in essence a "hybrid" between a Single Wall Tank and a Double Wall Tank. A primary tank (usually a cylindrical geometry) is placed inside of a "tub" or dike to provide secondary containment in the event the primary tank leaks or is ruptured. Normally, the secondary "tub" or dike will allow for the containment of at least 110% of the primary tank liquid volume. Dike Tanks do not entirely wrap or envelop the primary tank. Many tank designs do not provide "rain shields" to prevent the accumulation of rainwater in the "tub" or dike. We heartily recommend the use of welded rain-shields when considering dike tank products. Welded rain-shields are the only way to prevent the accumulation of rain water in the dike area.

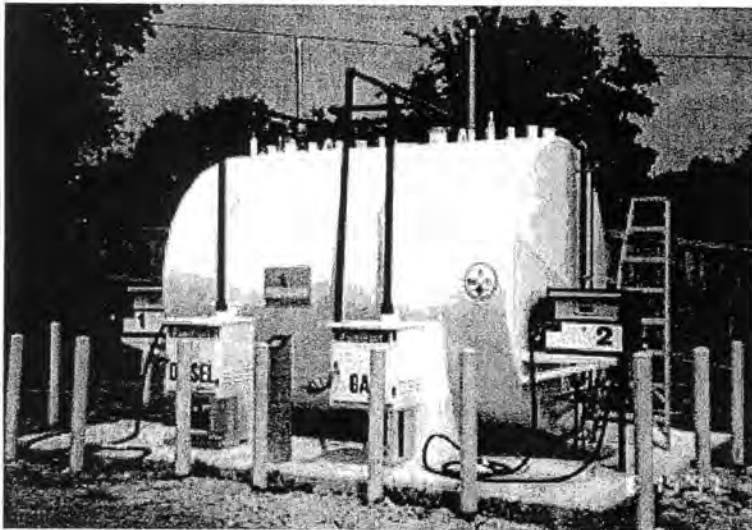
Dunn Industries manufactures Dike Tanks in a variety of sizes and geometries. Dike Tanks are relatively easy to install and afford easy relocation."

Tanks Direct  
10756 Rhode Island Avenue  
Beltsville MD 20705  
Tel. 800/865-5555  
<http://www.tanksdirect.com>



"Designed, built, and labeled in accordance with UL-142. 110% Minimum Secondary Containment. standard on all units. Elevated design allows for complete visual inspection under containment dike. Optional rainshield provides protection from the elements and collection of rain water and debris. Sizes from 240 to 30,000 gallons.

## Containment Dike Tank



## Turnkey Aboveground Fueling Systems

"Whether you have a 500 gallon tank for fueling golf carts or a 50,000 gallon tank fueling hundreds of large tanks every day, these systems can save you costly piping and electric fees charged by local contractors. Our turnkey systems are completely pre-piped and pre-wired to an explosion proof junction box, ready for use upon delivery.

"We combine the latest technology in dispensing equipment, leak/level detection and fuel management systems, with an above ground storage tank to meet your requirements. Each system is filled with fuel and tested prior to leaving the factory to assure a "no hassle" project for you and your staff."

"Some of the systems provided have been used for:

- marinas
- golf courses
- construction sites
- trucking companies
- airport/flying fields
- garages
- rental car companies
- manufacturing companies
- refuse haulers
- lumber yards
- sand & gravel companies"