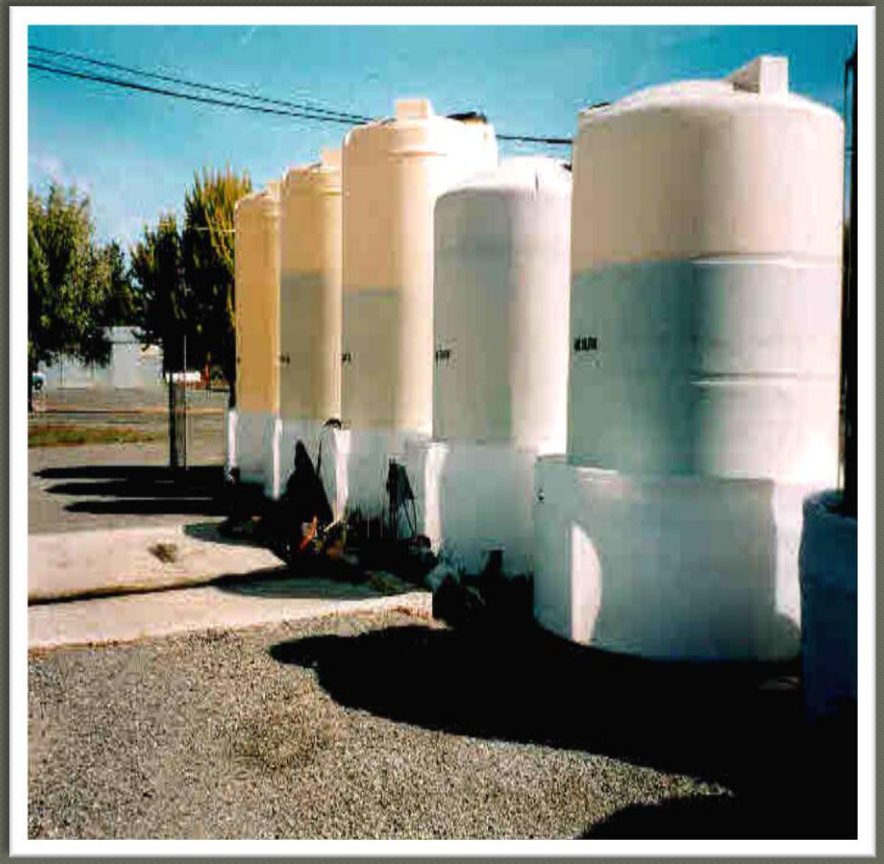
Fluid Fertilizer Workshop

Johnny Council

A Typical Tank Farm

Storage Tanks

A 30,000 Gallon NH3 Storage Tank



Liquid Poly Storage Tanks With Containment

Tank Variation

Impact Protection

Tanks and Tankers

From Carbon Steel To Poly, Our Troubles Are Over

Maybe Not

Cleaning Up The Mess

Poly Tank Failure

Same Day, Different Location

Life Expectancy?

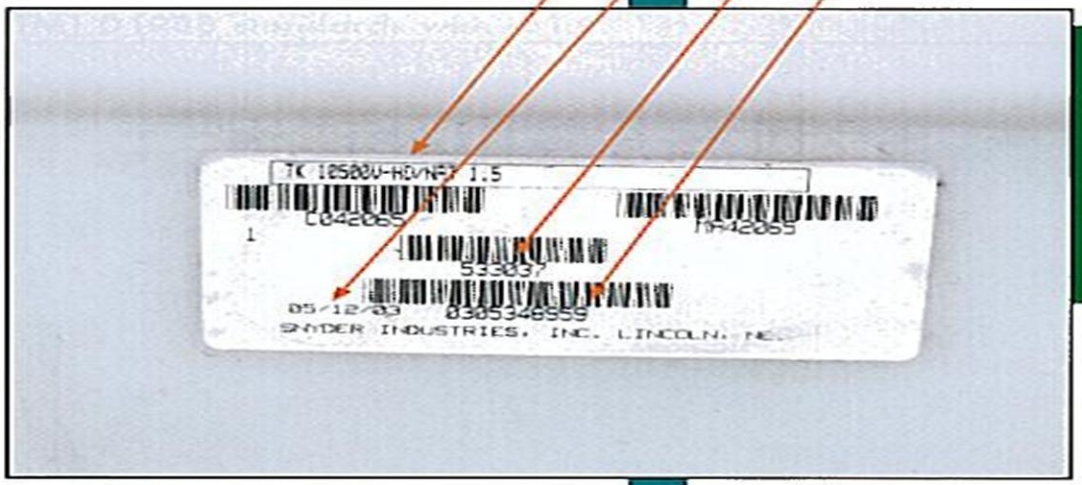
Poly tanks generally are manufactured by using a process known as rotational molding. A powdered polymer compound with an ultraviolet (UV) protection package is poured into a two-piece mold. The amount of UV protection varies by tank type and manufacturer. The mold is clamped shut and heated in a hot oven. During the heating process, the mold is tumbled in two directions; as the powered polymer melts, the tumbling causes it to coat the inside of the mold. Once completed, the mold is moved into a cooling chamber where the temperature is slowly decreased. The completed tank is then removed from the mold.

This process molds poly tanks as a single piece. A visible external seam —known as the parting line—gives the impression that two pieces are joined together. But the parting line is merely an external cosmetic artifact from the manufacturing process; it represents the juncture of the two pieces of the mold, not the tank itself.

Notice the parting line on this tank.

In general, the weight of liquid fertilizers ranges from 10 to 12 pounds per gallon. Specifically, 10-34-0 liquid fertilizer weighs 11.67 pounds per gallon, while 28-0-0 liquid fertilizer weighs 10.7 pounds per gallon. Most pesticides weigh slightly below or just above the weight of a gallon of water. At a minimum, fertilizers should be stored and handled in poly tanks with at least a 1.5 specific gravity rating. A good rule of thumb is to purchase a tank with a specific gravity rating at least one increment higher than that of the product you intend to put into it.

The specific gravity rating tag may no longer be attached to the tank, and it is impossible to guess it based on the tank's appearance. Ask your dealer for the specific gravity rating of the tank you're considering, review the manufacturer's catalog, or examine the tank specification sheet. In some cases, the specific gravity rating is part of the product code. Some manufacturers stamp information on the side or top of the tank. These variations make purchasing used tanks a real challenge.

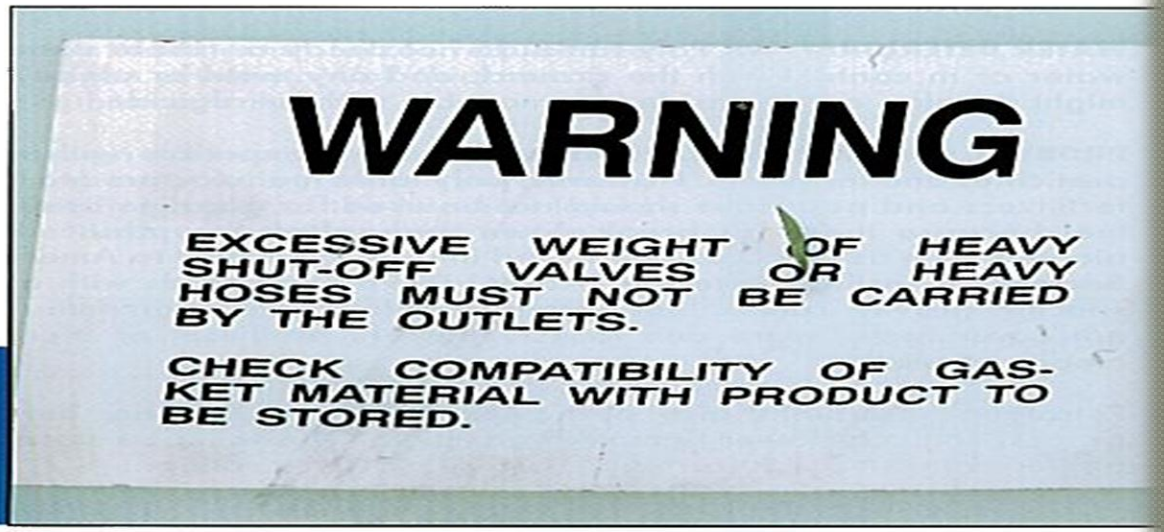


Poly tank manufacturers code their tanks as indicated by the highlighted numbers (right). Refer to your tank's code when contacting the manufacturer to determine its specific gravity rating.

Manufacturers normally attach a tag to the poly tank (top photo). This tank tag indicates a high density 1.5 tank.

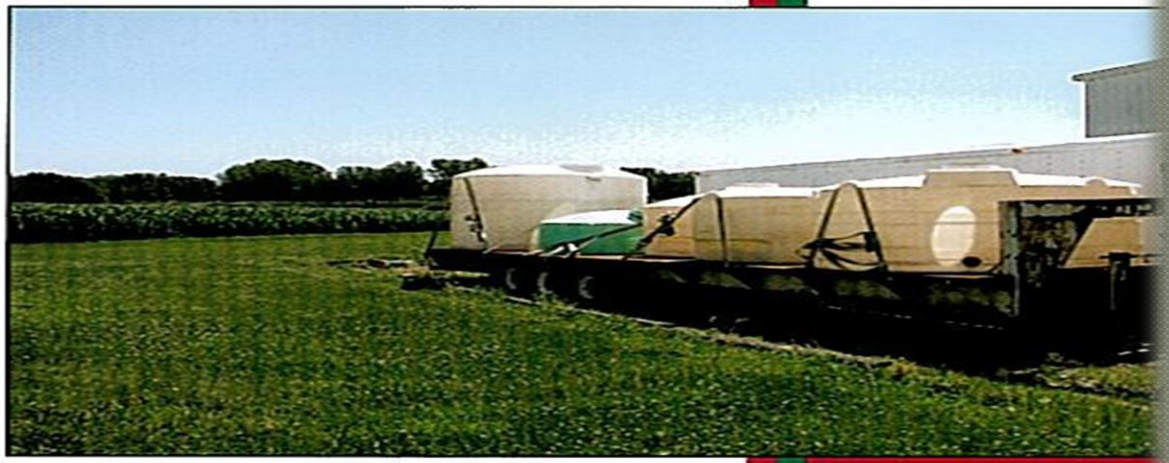
Experience has shown the importance of selecting valves, gaskets, and hoses that are compatible with the products to be stored in the poly tank. In certain cases, replacing a gasket with one that will stand up to biodiesel makes an HDLPE tank acceptable. Using compatible equipment prevents component failure and product release.

Read and heed all attached warnings on the use of poly tanks.



Tank Design: Vertical Storage and Horizontal Transport

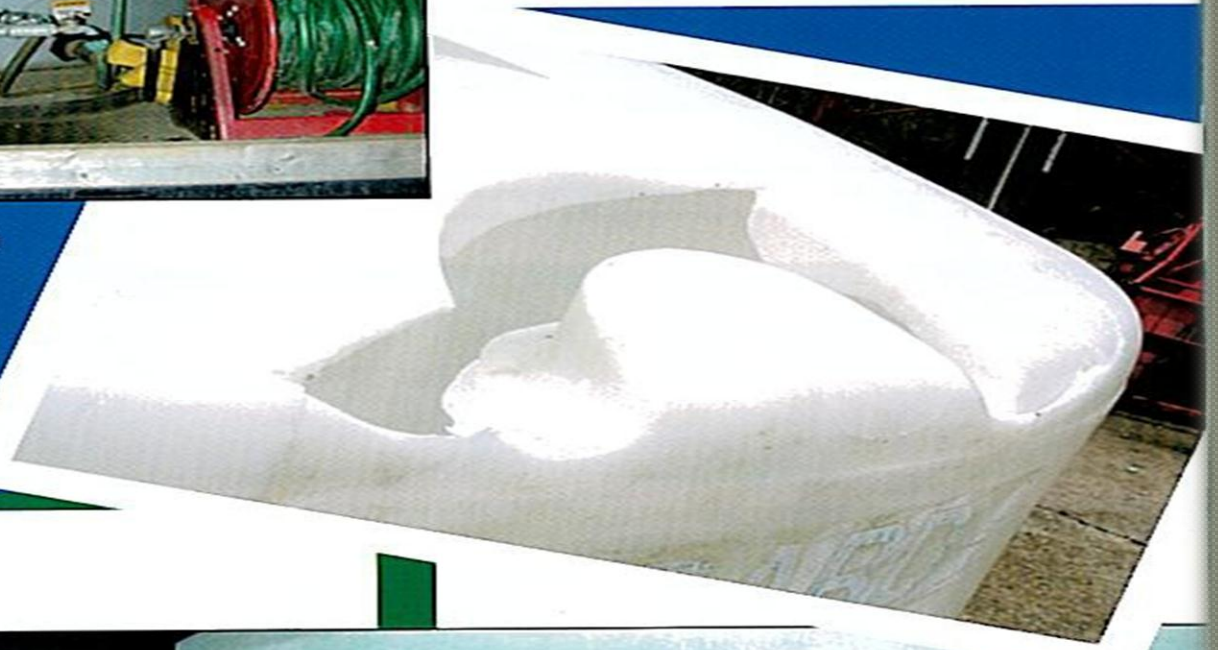
Poly tanks have two distinct use designs: vertical tanks (also called stationary, upright, or hockey puck tanks) and horizontal tanks (side-to-side, transport, application, or leg tanks). The significant design differences between vertical and horizontal tanks dictate how they should or should not be used. Using a tank outside its design specifications voids the manufacturer's warranty and increases the odds of tank deterioration, tank failure, costly cleanup, and lost inventory.

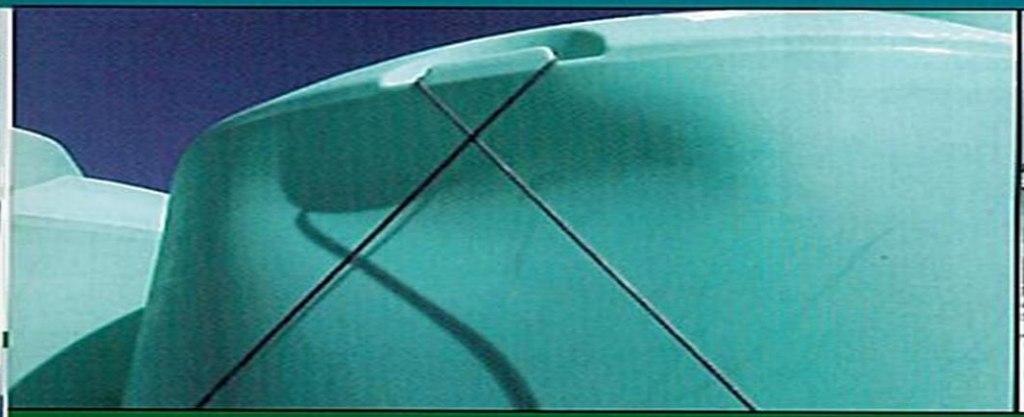


The storage tanks in this photo are being misused as transport tanks.

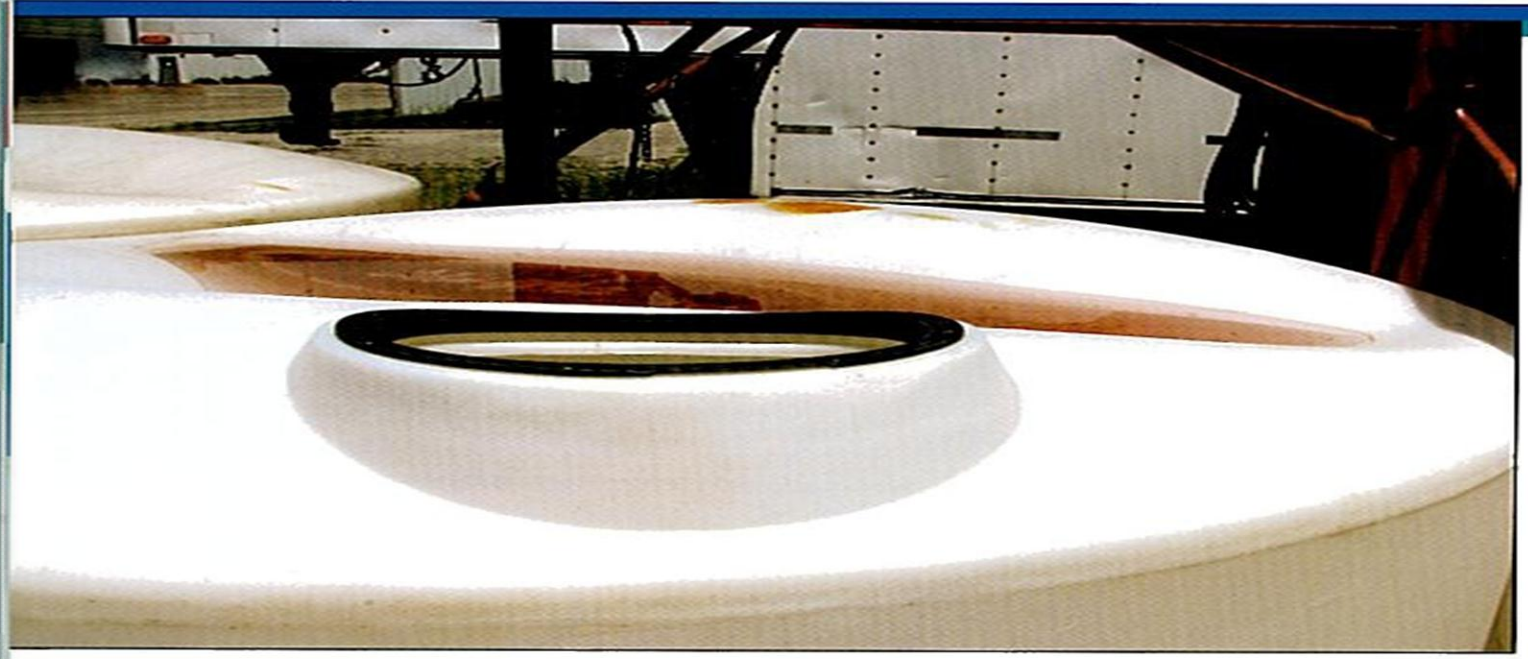
A storage tank used for transport (above) can fail at the points where its tie-downs are attached. See breakage from this type of failure in the middle photo. Storage tanks are not designed for the rigors of transport.

The two photos at the bottom of this page show someone's meager attempt to secure a storage tank. There is no safe way to do it, so don't!





Vertical storage tanks (above) show deformation caused by the owner's attempts to secure them onto a trailer. They were not designed for transport. In the photograph below, water stands in an indentation made by the over-tightening of a tie-down.

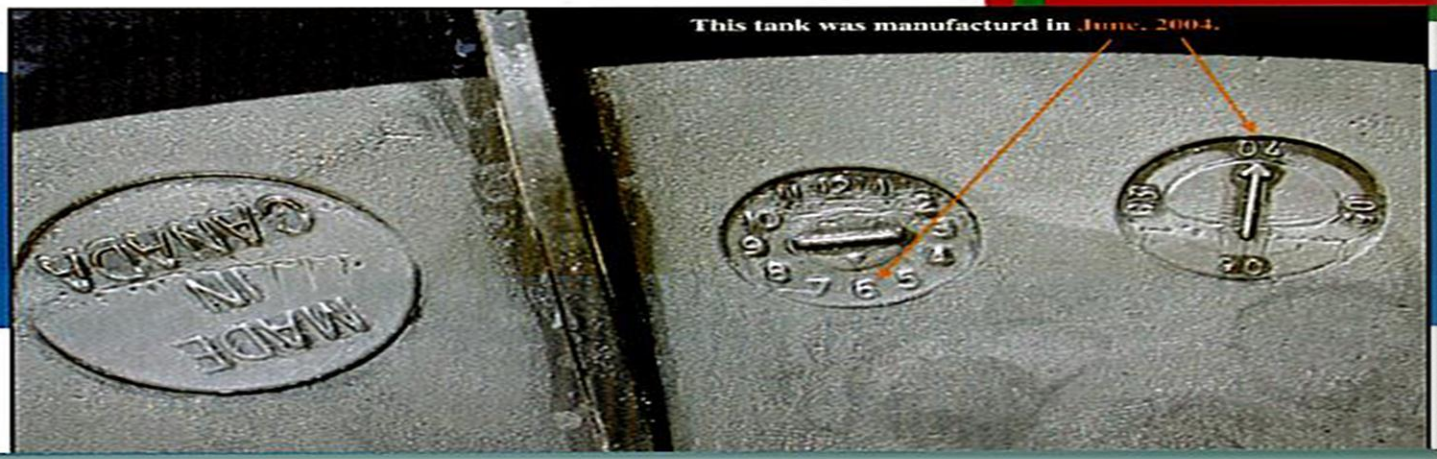


Warranty

Manufacturers usually guarantee their tanks to last three to five years from the date of manufacture, not the date of purchase. Most tanks have three-year warranties, but longer warranties are provided on more durable tanks such as those with a 1.9 specific gravity rating. The date of manufacture often is imprinted on the tank as part of the serial number, but not always. If you cannot clearly determine the manufacture date of a failed tank, have the manufacturer look up the serial number.

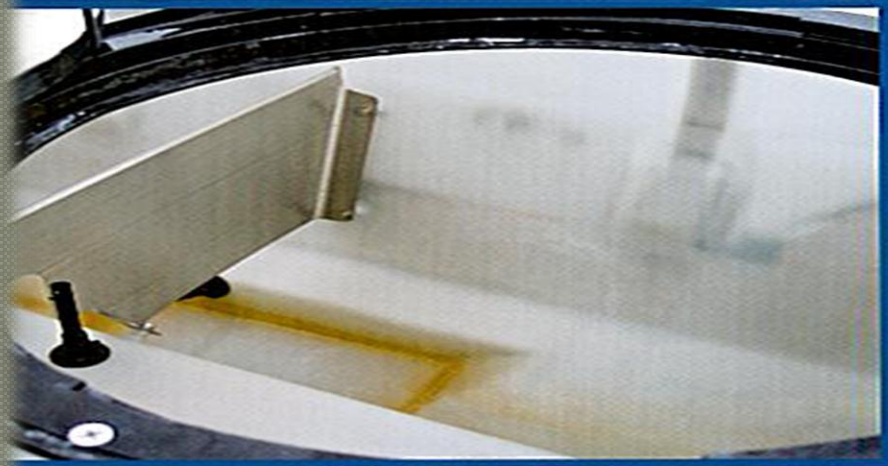
Most warranties cover the tank if used according to the manufacturer's specifications and if failure occurs during the warranty period. Coverage is for workmanship and materials only. Under these terms, a defective tank would be repaired (if possible) or replaced at no cost to the original owner. Warranties do not cover the replacement cost of lost product or environmental remediation due to a release or spill, nor do they cover tank failure where the material stored had a specific gravity higher than the tank's rating. Read the manufacturer's warranty to find out what is and is not covered.

Establish a file marked "Poly Tanks" for all shipping papers, warranties, delivery tickets, etc.; while your tank is new and clean, record serial numbers and parts numbers that are stamped on or into the plastic or written on a decal, and file them for future reference. Such information is commonly required to file a warranty claim with the manufacturer.



Baffles must be positioned opposite the direction of travel to be effective in slowing the forward and backward surge of liquid in transport. The tanks in the upper left-hand photo are mounted improperly, and the baffles inside the tanks would be ineffective. The tanks in the bottom photo are mounted properly.

The middle photos show metal baffles (left) and molded plastic baffles built into the tank (right).

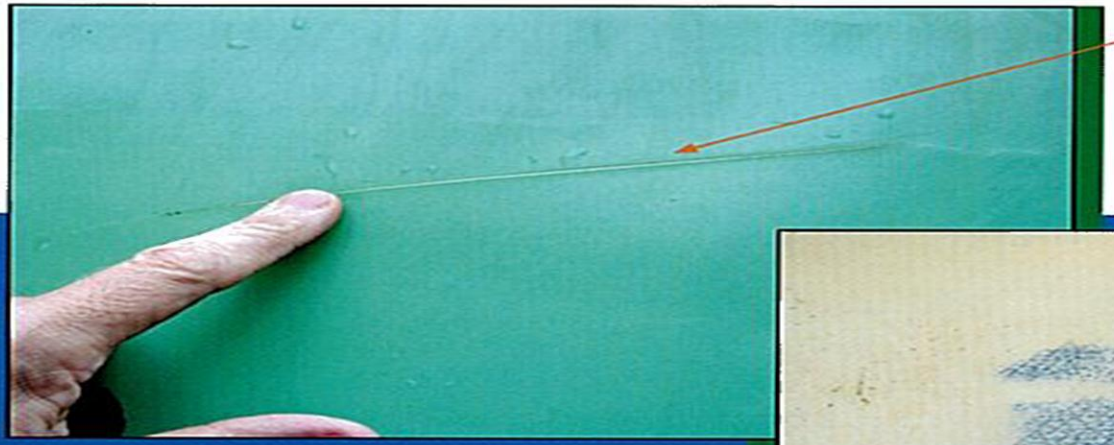


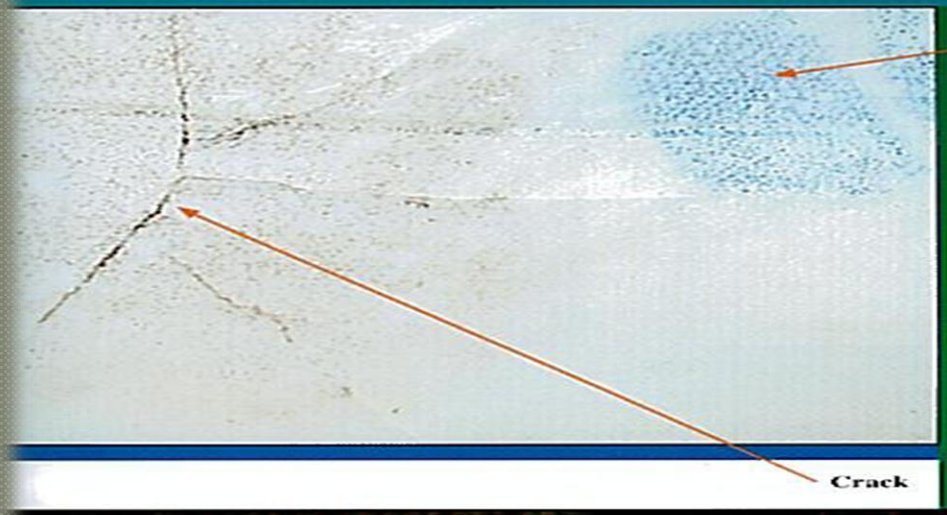
Portable baffles can be added to poly tanks.

It is difficult to visually determine a good tank from a bad tank. Three simple inspection techniques — writing with water-soluble ink, candling with light, and hitting with a baseball bat—can pinpoint weakened walls and stressed areas around the fittings.

It is important to know the difference between surface scratches, crazing within the tank wall, and cracks that extend through the tank wall. Crazing is the development of very fine cracks within the tank wall, usually appearing as a network of fine lines that cannot be felt with a fingernail. The tank will still hold liquids, but its structural integrity is significantly reduced. Crazing occurs in both high density and cross-linked poly tanks; it can be a sign of serious deterioration within the plastic, which leads to cracks and fractures. Cracks can be felt with a fingernail. It is common for the poly material around the crack to appear whiter than the surrounding polymer. Most scratches displace minute amounts of polymer but remain superficial.

- Scratches are open to the surface; displaced material is evident on the tank's surface; fingernail catches.
- Crazing is displayed as a patchwork of fine lines.
- Cracking causes no displaced material; very abrupt lines may run parallel or cross at right angles; UV cracking has a dry-rot or alligator-skin look in advanced stages; fingernail may catch.




Crack


Crazing

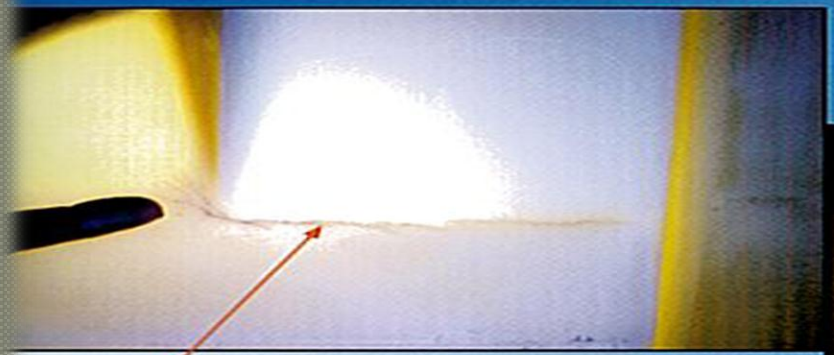

Candling reveals crazing of this poly tank.

Candling:
Visual Inspection with a Light

Candling consists of placing a bright, cool light source inside a poly tank while conducting a visual inspection from the outside (do not use a hot lamp, as it could melt the tank). Defects and cracks usually show up as areas or lines of different light intensity.

Repeat this procedure with the light on the outside of the tank and someone looking through the fill neck or manway. Do not enter the tank. A camera, camcorder, or other optical device may be helpful in recording the inspection from the top of the tank.

Use a light source to help locate defects when inspecting poly tanks. The technique is called "candling."



Venting Dry Storage Tanks


2

Unloading Railcars

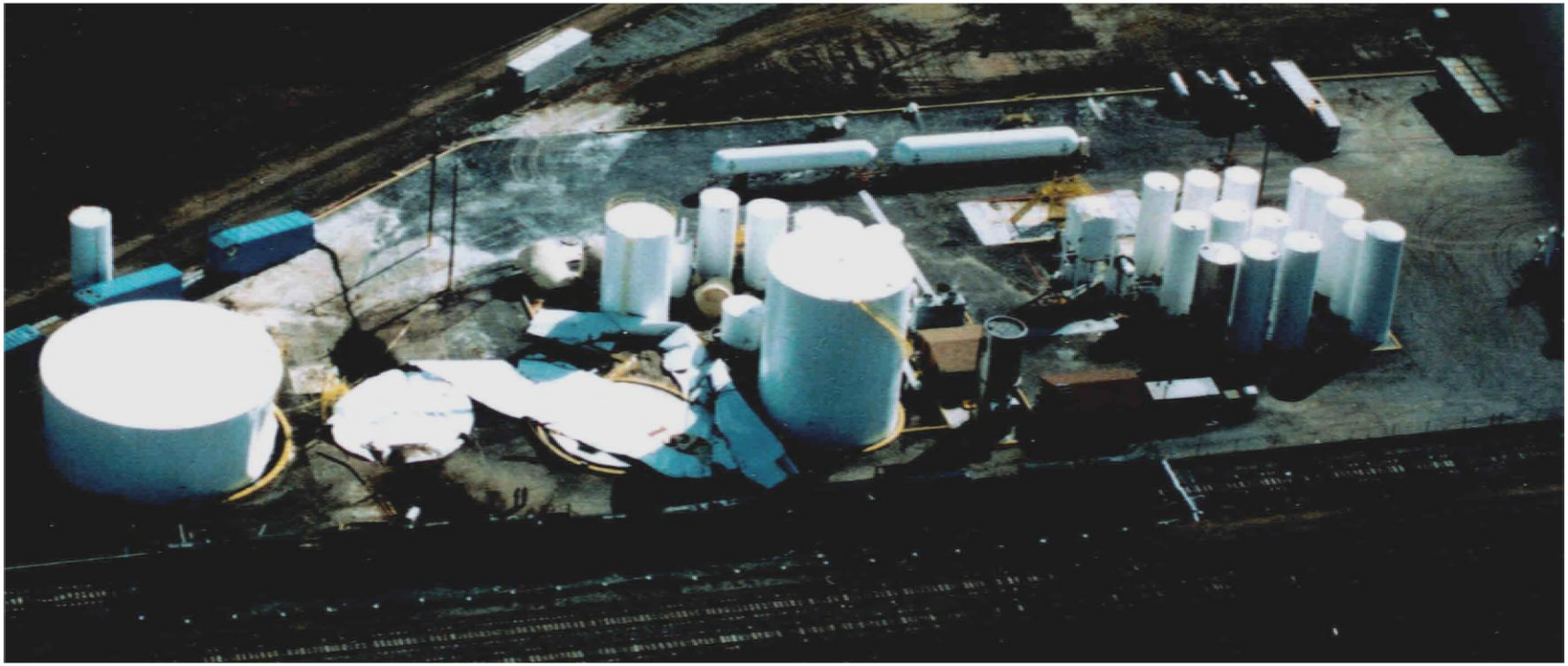
Large Tank Storage

Large Tank Inspection

Inside Pitting

Inside Tank, Vertical Weld

Total Tank Failure

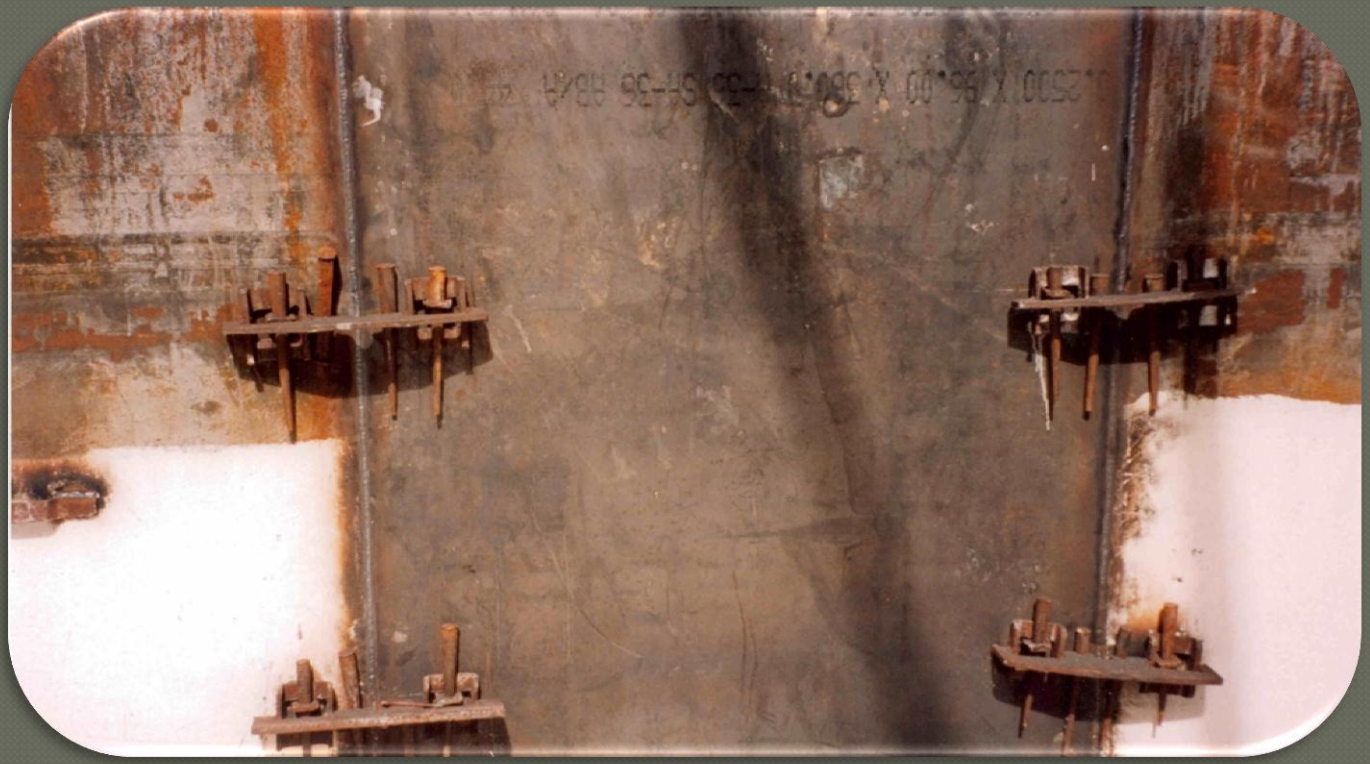


The Top Of A 500,000 Gallon Tank

The Force Behind The Wave

Wild Ride

Repairs on 600,000 Gallon Tank After the Wave



Replacement Of Door Opening on 600,000 Gallon Tank

The End