STORAGE TANK TRENDS

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Since 40 CFR Part 280 was first promulgated in 1988, the storage tank industry has undergone a number of changes and trends. The last five years in particular have brought about new tank buying patterns, such as:

- Capacities of new storage tanks are increasing on average
- Compartment tanks have become very popular
- Thick clad steel tanks and jacketed tanks are preferred over cathodic protected tanks in some regions
- Third party testing standards for steel tanks have been revised and supplemented by additional standards
- Tanks installed aboveground are preferred by nearly all tank buyers, with the exception of the retail motor vehicle fueling market
- Secondary contained and insulated aboveground tanks are also allowed now by some fire codes in conjunction with fueling facilities, when, earlier, tanks had to be installed underground.

Steel tank fabricators have reported relatively little fluctuation in the number of steel underground storage tanks built during the past six years. This fact is disheartening to both the fabricators and the regulatory community, since the 1998 deadline is just around the corner. At the same time however, the steel tank production business has undergone a revolutionary amount of change. For example:

- Steel Tank Institute statistics indicate the average underground tank capacity has increased by nearly 15% during the last three years alone.
- Pre-engineered cathodically protected (the sti-P 3 ® standard) dominated the UST market the latter part of the nineteen-eighties. Today, the number of P3 units produced is less than one-quarter of late 1980 figures.
- Composite tanks, such as those built to ACT-100® or UL 1746, and jacketed tanks, also built to UL 1746, have been fabricated with increasing frequency. Composite tanks are built with a thick FRP coating applied directly atop the steel tank surface, while jacketed tanks are built with an inner steel primary tank and
separated from the tank with an outer containment of fiber reinforced plastic or high density polyethylene.

- New composite steel tanks are now emerging. Recently, both Underwriters Laboratories and Steel Tank Institute have approved thick coated urethanes for steel tanks, without the need for anodes. STI has named this technology ACT-100-U.

- Prior to the EPA regulations, steel tank manufacturers could build "stock" tanks during the winter and inventory the tanks for the busy construction season. No more. Today, nearly every tank is custom built. Fittings are attached in special places to accommodate the wide variance in tank installations and tank appurtenances.

- Installation of compartment tanks have become quite common. Some fabricators have reported as many as 40-50% of their underground tank orders require multi-compartments built into the tank. Why? Some owners prefer the reduced installation costs of a compartment tank, lower insurance premiums, and reduced registration fees. A secondary contained tank with three compartments will require only one outer containment and only one interstitial release detection device. A corollary trend among petroleum marketers is on-site blending of mid-grade octane fuels and hence eliminating the need for a third tank or compartment.

- Secondary contained steel tanks continue to be specified with greater frequency. Factory applied vacuum, placed in the interstice, assures a sound and integral primary and secondary tank during shipment and backfill. Non-metallic tank manufacturers routinely ship their secondary contained tanks with water between walls to provide a built-in monitoring method.

- Underwriters Laboratories recently revised both UL 58, 9th Edition, on December 13, 1996, and UL 1746, 2nd Edition, revised September 13, 1996, adopting a performance formula to establish steel tank wall thicknesses. The Roark formula has been incorporated within the standards to calculate minimum steel wall thicknesses assuring adequate structural integrity for tanks buried in high groundwater and/or deep burial conditions.

Compartment tanks, increased tank capacities, and alternative non-cathodically protected UST technologies contribute to the reduced number of new sti-P 3 ® underground storage tanks built today. Retrofitting existing steel tanks and FRP tanks with lining and retrofitting existing steel tank and pipe systems with cathodic protection, are further factors contributing to the reduction in UST fabrication. In conversations with experts in the retrofit business, I surmised that several thousand tanks are retrofitted each year to assure tank owner compliance with EPA's requirements for compatibility and control of corrosion.
But I believe it's the AST evolution which is most significantly impacting the underground storage tank market. Aboveground storage tanks are the rage of non-petroleum marketing tank owners, particularly with fleet owners and chemical tank owners. One STI member reported that 80% of their atmospheric tank fabrication business in 1996 came from the aboveground tank market.

In a survey STI conducted in 1993, STI was one of the first to uncover this phenomenal trend. Business owners liked the merits offered by aboveground tanks such as visual release detection plus, many tank system owners perceive the storage of hazardous liquids aboveground as less regulated and less likely to cause environmental damage and subsequent clean-up costs.

Of course, history has shown that releases from aboveground tanks are not uncommon, overfills and vandalism being the most frequent causes. And, certainly, regulations do abound. The Environmental Protection Agency has its Spill Prevention, Control Countermeasure (40 CFR 112) requirements under the Clean Water Act and also its Oil Pollution Act. In addition, several unsuccessful attempts have been made in Congress to further regulate aboveground tanks and prevent spills.

Factory fabricated aboveground tanks are more of a concern in the fire safety community than within the environmental community. Nonetheless, the impact of the environmental concerns for containment of underground storage tanks has transmitted to the aboveground storage tank market.

The national model fire codes, NFPA, UFC, BOCA, and SBCCI, have opened the doors for motor vehicles to be fueled from aboveground storage tanks through recent code changes. As a general rule, this concept was not allowed at the start of this decade. Fatalities caused by major tank fires 20-30 years ago formed the basis for codes to prohibit aboveground fueling systems. But new equipment, better operating practices, greater education of the public and code officials in reducing risks, and the adoption of stringent rules have led to much safer storage of flammable and combustible liquids. For example, the codes require spill control, overfill shut-off devices, emergency vents, secondary containment, security, anti-syphon devices, and vehicle impact protection of aboveground motor vehicle fueling systems.

A tank installed inside of a concrete or earthen dike used to be the norm prior to 1993. Today, NFPA 30, NFPA 30A, and the Uniform Fire Code allow secondary contained tanks to be installed in lieu of diking when specific conditions are met. Such conditions include specification for gages, fill shut-off alarms, maximum tank capacity limitations, and minimum separation distances from important buildings and property lines.

A third to a half of the aboveground storage tanks built at the factory today have secondary containment built into them, whereas such construction generally did not exist prior to 1990. Tanks are shipped in unitized steel dikes, as blanket wrap type secondary construction, or as insulated tanks. No longer are tanks cylindrical in geometry only, as rectangular tanks have entered the market. Rectangular tank capacities are typically less
than 2,000 gallons. Underwriters Laboratories issued their 7th Edition of UL 142, revised April 5, 1995, to reflect all of these new trends.

The emergence of insulated tanks is a significant trend. Insulated tanks are further defined by code as either fire resistant tanks or protected tanks. Protected tanks, built to UL 2085 standards, are commonly marketed by tank fabricators involved in this sector of the business. This standard involves a two hour fire test at 2000 degrees Fahrenheit with strict limitations in temperature change within the tank during the test. The philosophy behind this construction is that the insulation will minimize the amount of vapors generated during an actual fire. Vapors must be exhumed through the atmospheric tank's emergency and normal vents in order to prevent the tank from becoming over-pressurized catastrophically. Some protected tanks are further tested for vehicle impact resistance and ballistics resistance.

A number of protected tank constructions have evolved. The two most prevalent designs incorporate either a steel tank wrapped in a plastic membrane and encased in concrete or a perlite-cement mixture placed between two walls of steel. Protected tanks are often mandated by the local fire authority having jurisdiction. Tank owners enjoy the greater flexibility in siting of protected tanks vs. non-insulated tanks, as protected tanks can be placed on a lot one-third the size of a lot required when non-insulated tanks are used for motor vehicle fueling. And diking is not necessary, particularly with listed secondary contained systems.

Activity continues in this forum. UL has begun a harmonization process of American aboveground tank construction standards with Canadian ULC standards. Also, UL hosted an initial meeting in February, 1997 to establish a new standard and listing for AST assemblies, identified as outline UL 2244. Here, the tank and all its important attachments would obtain a single UL Listing.

The fire codes also continue to evolve. The UFC is considering moving its requirements for AST fueling facilities from an appendix to the main code body. In its 1996 edition, NFPA 30A increased the allowable size of Class II, diesel tanks installed aboveground for fueling vehicles, from a maximum of 12,000 to a maximum of 20,000 gallons in capacity. NFPA 30 added a new requirement for secondary contained ASTs to be tested for integrity (primary tank and its integral containment) prior to operation, just as the code already requires for underground storage tanks. And finally, all of the model codes are working to unify their fire codes into a single national model code (the International Fire Code) by the year 2000. The International Fire Code will be developed.

Truly, a lot is happening in the world of tanks. With over a quarter million tanks yet to come into compliance, 1997 and 1998 will be busy years for the tank industry. What trends can we expect next? How about tanks with dispensers and canopies completely pre-fabricated off-site? Will bladders ever achieve popularity as the plastics/elastomeric industry continues to achieve success with flexible pipe systems? Whatever emerges, there's no doubting the exciting nature of this ever-active marketplace.
References

1. sti-P 3 ® Specification and Manual for External Corrosion Protection of Underground Steel Storage Tanks , Steel Tank Institute, April, 1996.
2. ACT-100® Specification for External Corrosion Protection of FRP Composite Steel Underground Storage Tanks , Steel Tank Institute, April 1996.