VAULTS EMERGING AS ANSWER TO NEW JERSEY'S TANK DILEMMA

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Thousands of New Jersey businesses need to store petroleum products at their facilities, whether for heating, to fuel vehicles, for emergency generators, or a dozen other pressing needs. Today there are estimated to be in excess of 80,000regulated commercial tanks in New Jersey alone. Most are underground, some above ground and, recently, some combining the best of both methods, the concrete vaulted tanks. In this article I will take a look at each approach for its strengths, weaknesses and cost factors.

UNDERGROUND STORAGE TANKS (USTs)

Historically, petroleum storage was literally driven underground by a variety of concerns centered around fire safety. Because of these concerns, and the regulations they spawned, the overwhelming majority of storage tanks in use today are underground tanks.

In the past five years the federal EPA and State Departments of Environmental Protection and Energy (DEPE) have formulated new construction criteria for both the installation of new tanks and the required upgrade of existing tanks.

With scheduled deadlines for these tank upgrades quickly approaching, tank owners are faced with some difficult economic decisions. The cost for tank and piping upgrades starts at $10,000, and, in most cases, retrofitting an existing steel underground storage tank is a short-sighted and expensive undertaking. Due to variable water tables and the predominance of clay and silt soils, both vapor monitoring and continuous groundwater monitoring are impractical, if not impossible, and in all cases will only alert a tank owner of a leak after the damage has occurred.

With these concerns complicating the upgrade, the most effective solution, if we stay with conventional underground storage, is often complete replacement of a given storage tank system This then expands the price range of a standard 2,000 gallon tank job to a minimum of $20,000. (triple this number for a 12,000 gallon tank).*

In addition to these basic construction costs, there are significant costs associated with simply maintaining and operating underground tanks. These expenses must also be considered when we evaluate the total project cost. For purposes of comparison, let's look at these costs over a 10-year period of 12,000 gallon UST ownership in the State of New Jersey.

Right up front, we have the NJ DEPE's registration requirement which commands a SI00 annual fee. While fees may certainly change from year to year, it is a safe bet they will not decrease. Over a 10-year period, this adds minimally SI000 to the cost of the project.

Then there is the cost of insurance. The NJ DEPE technical requirements N.J.S.A. 58:10A, effective 9/90, lay the groundwork for UST owners to carry their own insurance against leaks and discharges. Chapter 14 of this regulation, which has not yet been released, spells out the specifics of such insurance. When the insurance industry completes its research on the risks associated with UST insurance and prepares a product to cover UST owners, it appears likely that such coverage may be mandatory - another significant operating cost.

Currently, contractors' pollution liability insurance is available, and many installation firms carry it. When a firm which performs 20 sizable installations in one year pays S50,000 for the pollution liability portion of its insurance program, it follows that each installation will be expected to carry a prorated share of the burden. or $2500.**

Annual testing of the tank's anticorrosive protection system is another cost which must be added to the equation. A $400 yearly maintenance/service contract which includes an inspection of the protective system and periodic water pumpouts is a necessary investment and adds S4000 to the long-term operating costs of our new UST.

Finally, as with any long-term ownership of a capital item - especially one with delicate electronic monitor sensors and controllers - we must look at the devalued worth of the item after wear and tear, obsoletion, and depreciation. This loss must be figured into our equation as well.

Adding all these factors together, the total cost of our hypothetical 10-year UST ownership, including the initial system construction, amounts to approximately $90,000.

Certainly, there must be less expensive options.

ABOVE-GROUND STORAGE TANKS (ASTs)

Above-ground storage tanks have been around for some time and are commonly used for fuel storage. Their applications vary from the small 275 gallon free-standing residential basement tanks to massive compounded field-erected storage silos.

ASTs are currently receiving much attention and interest. They are completely exempt from NJ DEPE requirements, including requirements for registration and insurance. This freedom from restriction coupled with relative ease of AST installation, reduces the ten-year cost of ownership to one half that of a comparable UST.

There are however, drawbacks to the ASTs as well.

First, to safeguard the tank area in the event of an overfill or a rupture of some sort, the AST should be diked or placed inside a second tank system. Second, an open dike can fill with rain water and possibly rust from the inside out. Third, exposure to the elements will accelerate corrosion of the tank as well as the dike.

A brush-blasted white epoxy-painted. diked AST with either a shed roof or rainshields is the state of the art in ASTs, but the fact remains that the unsightliness of the tank, plus its size, can be a major drawback.

For the storage of gasoline there is a potential vapor hazard with ASTS. Because of this, they are prohibited by NFPA 30 in some situations. The effects of cold temperatures on the viscosity of fuels must also be addressed. Often, this requires the installation of steam coils or electric heaters.

But the largest drawback for the application of ASTs over USTs is the zoning hurdle.

USTs are exempt from BOCA codes while any above-ground construction over 100-foot square must obtain site plan approval in most communities. If the ownership is corporate, such approval must be presented by legal counsel. This process involves public hearings with mandatory notice to neighbors within 200 feet of the property line. Unsightliness of the AST may become a minor sticking point as more significant concerns such as environmental impact and overall nature of the owner's operation come under the scrutiny of often hostile neighbors.

The process of gaining AST approval can become quite costly, bringing the upper end of costs plus maintenance of our 12.000-gallon project to $55,000. This, of course, is all contingent upon actually winning a zoning board's resolution allowing the project to proceed.

VAULTED STORAGE TANK SYSTEMS (VSTs)

It is my premise that the vaulted storage tank system, our third tank alternative, offers a combination of the best features of USTs and ASTs. In VSTs, the primary tank is completely surrounded by an impermeable concrete enclosure. Designed in such a way that the primary tank is completely inspectable, VSTs are exempt from DEPE registration and regulation, yet they can be installed below grade and are therefore exempt from municipal planning board and zoning approval. And finally, when all the long-term operating costs are factored in, VSTs can be installed at a significantly lower cost than conventional USTs.

Historically, VSTs have been around for a long time in the form of burial vaults, septic tanks, and meter pits. More recent applications include optical tele-communication link pits, where accessibility, security and thermal isolation are all important considerations.

Design advantages inherent to VSTs are as follows:

- *Structural strength* - a concrete exoskeleton protects the primary tank from corrosion, deflection, thermal stress, ballistics and ground movement.
- *Thermal isolation* - the reinforced concrete vault is typically 6"-8" thick, thus providing protection from temperature extremes. Vaults come with a minimum two-hour fire rating.
- *Accessibility* - the primary tank is completely accessible, thus simplifying piping modifications, tank cleaning, and annual inspections or audits.

Installation advantages of VSTs are as follows:

- Whether below grade, at grade or above grade, configuration is identical, requiring no engineering modification.
- Anchor systems are unnecessary for VSTs where conditions would require anchoring of conventional USTs. VSTs are massive enough to overcome buoyancy problems.

- The vault can sit directly on the earth or gravel surfaces, thus minimizing surface preparation requirements.
- VST installations are exempt from OS HA shoring requirements. VSTs can be crane-lifted directly into machine-prepared excavation, so there is no need for personnel to work at the bottom of an excavation.
- There is no need for a concrete overlay as the vault roof can also serve as a surface pad. Where vehicle traffic must pass over the top of the vault, extra thick, reinforced vault lids are available.
- There are also significant maintenance advantages for VSTs inherent to the design and the accessibility of the primary tank. Electro-mechanical repairs are simpler as all conduits and pipes are exposed. Another advantage is that the precast concrete lid has much greater uniformity and strength than a conventionally poured surface pad. Forces that crack and heave surface pads are inconsequential to VST systems.

Finally for our 12,000-gallon tank example there is the economic consideration. With an installed price of 570,000, the VST does require a larger initial investment than a conventional UST; however, the operating costs over 10 years are limited only to painting and inspecting the primary tank with a budgeted price of $2500.

SUMMARY

From our hypothetical 10-year comparisons, it is clear that the cost of owning a VST, at $72,500, is considerably less than that for a conventional UST, at S90.000. And in comparison to the troublesome AST, the VST offers a clear-cut, value-added alternative.

THE AUTHOR

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* For comparison purposes, throughout this article tank attachments will remain constant and include the following: fullblown inventory control monitor and leak detection system with printer, overfill prevention and spill containment, double walled product line piping and piping sumps outfitted with leak sensors.

** This figure has been verified by Hal Melcher, UVW Associates, Somerset, NJ, with some restrictions.