Building Trouble-free Underground Tank Systems

Motor fuel tanks continue to pose problems, 20 years after the beginning of federal tank underground tank regulations. I believe a principal cause of failures is that equipment providers, contractors, owners and operators continue to ignore some basic essentials. This paper describes how following existing rules and common sense can prevent, or at least reduce, the incidence of system failure.

Newly installed and upgraded tank systems continue to cause problems resulting in deficient monitoring and leakage. According to the U.S. EPA, over 12,000 new releases were reported in 2003 including many from new or upgraded systems. The cost of repairs, environmental work and lost business is excessive and generally avoidable.

This is not to say that all tank system problems result from deficient design or installation, but inherent problems in a system resulting are not cured by subsequent operation and maintenance, no matter how diligent they are performed. Good operating and maintenance procedures will identify problems sooner than if done poorly or not done at all and this may reduce the consequences of the problems, but they cannot cure them.

Following are some well established good practices that reduce the incidence of failure.

To begin with, owners, operators, regulators, inspectors and equipment providers and contractors should recognize of three realities about underground and aboveground motor fuel tank systems:

1. Tank systems are sophisticated and complex.
2. Available equipment components are not equal.
3. No system will be reliable unless it is designed and installed correctly

... especially as designs change to meet more stringent regulations and enforcement of mandatory operating and maintenance requirements. For example, the proliferation of secondary containment, electronic gauges and sophisticated leak monitoring systems, vapor recovery and new innovations in dispensing, containment and piping technology increase the complexity of the systems and the

demands on the installer.

The benefits of secondary containment of components that contain fuel have become widely recognized and are mandated by some state regulations. The principal benefit is often not fully appreciated; it simplifies leak monitoring. Monitoring the interstices of double-wall tanks, piping and, more recently, containment sumps for leaks is the simplest leak detection method available. It is much easier that trying to identify releases of small quantities by reconciling inventories or sampling groundwater or soil vapors. While monitoring can be done manually, electronic systems, usually tied into electronic tank gauging electronics provides timely alerts with reasonable accuracy. The use of third part monitoring services offer a variety of services and greatly reduce the reliance in on-site personnel to monitor, interpret the warnings and alarms, and correctly respond to them.

To return to my first premise, tank systems are complex. Secondary containment, interstitial monitoring, and electronic gauges were not typical components of tank systems before the federal UST regulations were enacted in 1986. This increased the knowledge necessary to correctly design and install tank systems. The number of regulations, industry codes and standards related to tank system imposed additional responsibilities on the owner/operator to see that the systems were designed and installed correctly. However, I continue to see a significant part of the market ignoring the complexity of the systems and basing buying decisions on the lowest price that meets the minimum acceptable regulation in force.

This leads to the second premise, all available equipment components are not equal. Virtually every component of a tank system is required by fire code to be listed by a third part testing laboratory. The most commonly used by manufacturers are Underwriters Laboratories and Southwest Research, although other laboratories are offering these services. The fire codes typically require that the tank, dispenser, piping system, valves, etc. meet a criteria established by the laboratory and the manufacturers that will provide a reasonable degree of fire safety and environmental protection. In a way, fire code and environmental regulations share a common purpose-keep the motor fuel contained and controlled. Doing so accomplished the objective of both sets of rules.

Having a listing by an acceptable approval agency does not mean that the product was tested exhaustively for its functionality, only that that meets the minimum requirements of the listing. The materials of construction, manufacturing tolerances, design, durability and expected service life may vary considerably between products all bearing the same listing. Unless you have the need and ability to test various alternative products a good rule to follow is "you get what you pay for". Higher priced products may have longer or better warrantees, or be supported by a more effective service organization. When making a selection from among options with varying prices, keep in mind the potential cost of a failure of the component.

The third reality is that no system will be reliable unless it is designed and installed correctly. The

design of tank systems requires an accurate assessment of the owner's needs, knowledge of the available equipment alternatives and codes and regulations of the local jurisdiction. A designer with general engineering background but without this specific knowledge may not produce an optimum design.

Tank installation, a term that defies definition, has been blamed for a multitude of equipment failures and the resulting damages. Attempts to tighten the requirements for installation include education, testing and licensing, all worthwhile efforts. However, education requirements are frequently lax. In some cases, the licensing regulation only requires that the individual attend a training by a manufacturer and, while this serves the installer and manufacturer and meets the requirements, it is very limited. Manufacturers only instruct on the installation of their products, not similar products of other manufacturers or other system components.

Unless an owner is familiar with the installer, licensing may be counter-productive unless the rules and regulations are enforced. It may give an unwarranted appearance of competence. The purchaser of equipment should look beyond the mere fact that an installer is licensed and require the candidate for a project produce references. Checking references is essential.

When an installer is selected, the responsibilities of the parties should be clearly set out in a legally binding agreement. Among the requirements to ensure that the installation is done correct are a clearly stated scope of work, installer's responsibility for equipment provided by the owner; coordination of work performed by other contractors, testing to be performed, witnessed and approved during and after construction; and requirements for instruction and documentation of the equipment provided and work performed.

A letter proposal with a list of equipment to be provided and phrase "to be installed according to manufacturers' instructions" is totally inadequate and likely to result in disputes, particularly if a component fails and substantial legal and environmental costs are incurred. Manufacturers' instructions should be considered the minimum standard to ensure that the warranty will be in effect. Industry standards, federal and state laws and local fire and environmental codes may be more demanding than those of the manufacturer. When conflicting standards are encountered, the consequences of a system failure dictate that the most stringent be followed.

One key to trouble-free installation is the active participation of the owner or his designee.

Oversight of key phases of the work, particularly the initial phases and testing is essential. The

petroleum equipment industry is capable of producing tank systems with a useful service life of 30-50 years, with only routine maintenance and component replacement. The continued incidence of system failures indicates a need for a change in the attitudes of the parties. This may be forced on the industry by more stringent enforcement of fire, environmental and licensing regulations.

