

# Failing an Underground Oil Tank Test

## Interpretation, next step planning, prevention & retaining the customer

By Mark C. Annis

**F**uel oil dealers primarily respond to change by reacting to competing market forces. First it was the COD discounters, then it was the gas companies and we reacted to each in kind. Now with the underground tank subject looming, dealers are again buffeted by forces that affect our markets. Will we react as before or will we promote programs to derail threats? In New York and New Jersey, The Homeowner's Environmental Loss Protection Program set a precedent, becoming a valuable tool to thwart gas conversions. But more tools are needed, especially to plug the uncontrollable leak of accounts that occur at the time of a property transaction.

As vice president and founder of Annis Fuel Oil Service (AFOS), in the early 1980's I recognized underground oil tanks as an area of opportunity. With passage of the New Jersey Hazardous Substance Storage Act and amendments to the Spill Act, tank work began to overlap with environmental science. Four years of college chemistry paid off. While spinning off ANCO Environmental in 1991, I remained loyal to my oil industry beginnings. As a small oil dealer I am sensitive to the threat UST hysteria poses. With diplomacy I market UST services to local fuel dealers who otherwise compete with my family's oil company. Instincts say deny or minimize the UST problem. But the distant environmental storm is looming and must be addressed. Our customer's financial interests are at stake and they seek leadership. Fuel dealers must address and deflect the public relations damage caused by leaking underground tanks, learn how to select an appropriate tank test, define the true adversary behind the oil tank debacle and finally, find solutions. I hope the material presented herewith will help in these areas,

and prevent the loss of oil heat customers to other forms of fuel at the point of real estate transfer. *As both of my companies operate primarily in New Jersey, many references are made to New Jersey Department of Environmental Protection (NJDEP) regulations. These regulations may be mirrored by similar regulations in other states. Check your state Environmental Protection Department for specific regulations governing your area.*

### Misinformation

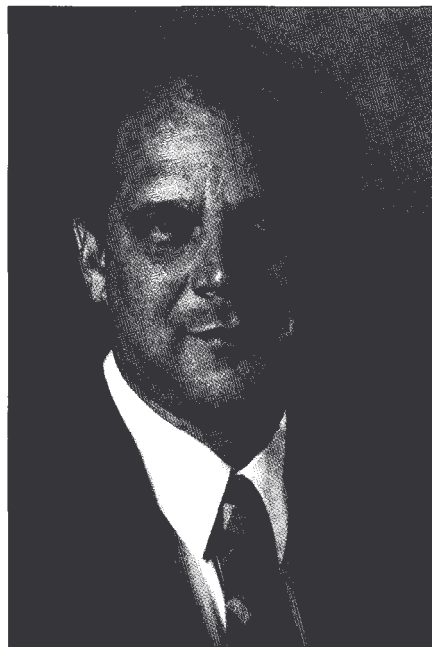
The gas companies have spearheaded marketing campaigns implying that oil heat causes underground pollution. Our observations support the opposite conclusion. Statistically more remedia-

tion projects involve abandoned or improperly closed tanks that active tanks. Homeowner insurance policies decline most UST pollution claims, therefore the leaking tank owner who converted to gas heat finds himself in a greater bind today than he who stayed with oil. But where the gas heated homeowner gets stuck with the remediation bill the oil industry shoulders the negative fallout. To win the public relations game, it behooves the fuel industry to deflect the problem. Redirect the emphasis from 'oil heat' to 'underground tanks', and take a proactive stand.

A fuel oil account is most vulnerable at the point of a property transaction. Tank testing and site certification is becoming more commonplace. Driven by liability concerns and the 'due diligence' audit requirement defining the innocent purchaser, buyer's attorneys secure their client's the right to test around an oil tank. Due largely to public misconceptions, this mechanism will continue to bash oil heat far into the future.

### Know Your Adversary

Recently a fuel dealer told me ".....it's the lawyers. They've blown this out of proportion." Others say its the gas companies, or the gas heating contractors, or the Realtors, or the yank-a-tankers. All these parties are a vocal reaction to the true, silent adversary; corrosion. Low pH soils coupled with a high water table enable a high ion exchange rate with the tank. Non homogenous backfill concentrates the resulting electrochemical reaction at points of greatest electrical conductivity. Therefore, soil particles with conducive mineral content or construction debris that touches the tank completes the corrosion circuit. Over time, this



MARK C. ANNIS is president/owner of ANCO Environmental Construction Inc., Berkeley Heights, NJ., a full service professional contracting and consulting underground storage tank (UST) remediator. He can be reached at (908) 464-3511.

**TABLE 1**  
**Interpretation of Test Results**

Test Type	Positive Result Means....	Conditions Leading to False Negatives
Air Pressure	Tank or piping leak	Clayey soil
tracer	Tank or piping leak	Clayey soil, high water table
Vacuum	Tank or piping leak	Clayey soil
Volumetric	Tank or piping leak	Clayey soil, high water table
Soil	Hidden contamination	Gravelly soil

reaction dissolves a hole into the tank. Laws of chemistry and physics are accelerated by poor construction practices. This is the underlying force behind the tank problem.

If we look at the history of environmental regulations, the foundation was the 1977 Federal Clean Water Act. This legislation focused on industrial pollutants. In 1984 with the passage of the New Jersey Environmental Cleanup Responsibility Act (ECRA), regulation-driven liability made the presence of an UST a headache for industrial property owners. This was the distant thunder of today's UST debacle. Stricter industrial environmental regulations have trickled down to residential situations.

In June of 1993 ECRA was amended and renamed ISRA, Industrial Site Recovery Act. Many positive changes made the regulations more "user friendly", and even compassionate with the creation of a spill fund. Virtually unnoticed in these amendments, however, was a companion change to the Spill Compensation and Control Act (Spill Act), introducing a principle significantly affecting all current and future owners of real property in New Jersey. The new principle promulgates that *future owners of polluted property are liable for contamination they did not cause*. The potentially devastating language of this amendment makes buyers responsible for any discharge of a hazardous substance unless they can satisfy certain criteria:

1. That they acquired the property through an inheritance;
2. That they acquired the property after the discharge occurred;
3. Lack of knowledge at the time of acquisition that any hazardous materials had leaked;
4. Lack of involvement in the management of the leaked hazardous substances before acquisition;
5. Notice to the NJDEP upon actual

discovery of the discharge.

In order to demonstrate that a new owner did not know and had no reason to know of the discharge of hazardous substances at the property, the acquiring party "must have undertaken, at the time of acquisition, all appropriate inquiry into the previous ownership and uses of the property." "All appropriate inquiry" requires the performance of a preliminary assessment, and if necessary, a site investigation. In the case of an underground storage tank, nothing short of soil testing meets the "appropriate inquiry" threshold, qualifying a damaged buyer as an "innocent purchaser." This concept is the cornerstone of the "innocent purchaser offense" used by buyers in pursuit of responsible or contributory negligent parties to the property transaction. Driven by regulation and just old fashion 'let the buyer beware', tank testing is here to stay.

### Choosing The Right Tank Test

The appropriate test is a function of tank status, site conditions and overall objective. Verifiability and timeliness of results are additional test selection criteria. Test limitations, potential false positive and false negative conditions are discussed following the introduction of each technique.

An overview of tank testing methodology is reprinted from ANCO's *UST LINE*, Issue #4. It poses the question "which tank testing method is best?" The purpose of a tank test is two-fold: to protect the buyer from a past leak and to protect the seller from being blamed for a problem that did not exist when he sold his house. To accomplish these objectives, we seek one answer: has the tank in question leaked and created an environmental problem? *In short, is the site contaminated?*

In choosing a test to answer this question, the first concerns will be accu-

rate results and verifiability. Ease of scheduling, quick results and cost are important as well. Finally, a test is needed that is applicable to the right situation, that takes into consideration soil stratigraphy and compensates for site conditions.

Soil conditions leading to false negative results are summarized in Table I. Mechanical conditions leading to false positive results are summarized in Table II. What to do once a leak is suspected is summarized in Table III.

The best testing option will meet all or most of the accuracy, verifiability, speed and cost objectives.

There are three major categories of tank tests: liquid, air and soil tests. The first two are in-tank test involving delicate computer based instrumentation that measures the loss rate of a reagent, liquid or gas, as it leaks out of the tank. This is precisely the drawback of in-tank tests. Will a buyer find any rate of leaking acceptable? Probably not. But the NJDEP does. To help compensate for certain limitations of these tests, the NJDEP has instituted a pass/fail leak threshold of .05 gallons per hour, below which the tank will legally "pass" the test. But this "acceptable" leak rate is 1.2 gallons per day, or 438 gallons per year. This will not be acceptable to most buyers.

For *liquid tests*, or volumetric tests, the tank must be filled with oil up into the neck of the fill pipe. Minute volume changes are observed and the tank fails only if the oil level decreases at a rate surpassing .05 gallons per hour.

- **Benefits:** This test entails no surface disturbance.
- **Drawbacks:** False positive results, indicating a leak, are not uncommon for conditions as benign as loose threads on the fill pipe. A fuel delivery must be tightly coordinated with the performance of the tank test itself. This involves additional expense. Worse still, if the tank does have a leak the test itself will discharge more contamination into the soil.
- **Verifiability:** Beyond test data review, verification is impossible without complete retesting.

*Air Tests* come in three types: pressure testing, vacuum testing and tracer testing. *Pressure testing* involves applying air pressure to the tank and watching for pressure drops. This is an outdated test which can blow out a weak spot in the tank and create a significant leak.

Vacuum testing involves plugging

**TABLE II**

Test Method	Possible False Positive Conditions
Air Pressure	Loose fittings on pipes
Tracer	Loose pipes or fittings
Vacuum	Loose fittings or pipes
Volumetric	Loose fittings or pipes
Soil Borings	Previous Spills

**TABLE III**

Test Method	Next Step
Air Pressure	Duck, you may be sued for causing the leak
Tracer	Perform a soil test
Vacuum	Perform a soil test
Volumetric	Immediately drain tank, then test soil
Soil	Perform quantitative analysis, delineate the extent of contamination or make tank removal arrangements

all pipes to the tank applying a vacuum, then listening through a hydrophone for leak sounds.

Tracer testing involves injecting an isotope of a rare gas into the tank and using sensors placed outside of the tank to sense a the leak of the rare gas. Results can take up to 10 days to process due to the gas migration period: i.e.: clayey soils retard the migration rate.

- **Benefits:** Vacuum and tracer tests are simple to coordinate, involve no surface disturbance and test the piping as well.
- **Drawbacks:** False positive results from lose fittings are not uncommon and the volumetric portion of these tests use the .05 gallons/hour standard.
- **Verifiability:** Other than data review, verifiability is only possible through complete retesting.

The third category, the soil test, directly measures the amount of oil that has already leaked, answering the central question directly, simply and cost effectively.

In this test, soil samples are retrieved from around the tank at depths of 6" - 12" deeper than the bottom of the tank. These samples are tested for petroleum hydrocarbons. Results are immediately available. Some methods include hand digging to the top of the tank to check visually for signs of corrosion and to precisely locate the edge of the tank. Clearly, the closer the sample's proximity to the tank, the more accurate its representation of underlying soil conditions. Analytic results are checked against NJDEP action levels for problem identification.

- **Benefits:** This is a simple test, not relying on electronic instrumentation. It detects oil spills from any source, including previously removed leaking tanks and overfills. Contamination resulting from overfill is easily differentiated from deeper contamination resulting from a tank failure. This

method is applicable to any underground tank, whether it is active (in use) or out of service. Even previously closed tanks can be tested to determine whether the tank leaked before closure and if that leak was not remediated.

- **Drawbacks:** Soil testing disturbs the soil, as this is an out-of-tank test that seeks the affects of a leak.

- **Verifiability:** 1 1/2" diameter bored holes can remain open, facilitating independent sample collection.

### The Next Step

After receiving test results, what should be done if there is suspicion of a leak or confirmed contamination? The next step is to determine if the test results are valid and if the site is contaminated. Vessel tests alone will not tell you this, so a soil test should be performed. Incorporated into this test can be tank and piping inspections to eliminate those conditions leading to possible false positive results. Conditions leading to false positive conditions are summarized in Table II.

Once it is determined the test is valid, it is now time to perform quantitative analysis, delineate the extent of contamination and/or plan for the tank removal and site remediation.

With the quantitative analysis, levels are compared with applicable action levels. Where levels exceed state regulations, a tank removal is undoubtedly required. But action levels lose their meaning when the question is asked. Why is there any oil 12" below the tank? It is arguable that small quantities are normal however, low levels may be the telltale sign of imminent gross tank failure. ANCO recently removed a tank where bored soil sample Total Petroleum Hydrocarbon (TPHC) analytic results were at 150 parts per million.

The dealer recommended removal even though results were well below the first NJDEP action level of 1000 ppm. (NJDEP allows up to 10,000 ppm TPHC in some cases). This dealer's recommendation rose above an often displayed instinct to deny the problem. Upon removal the tank was found to have dozens of pin holes in it. In this case, the dealer's concern for his customer prevented a small problem from becoming a huge problem. Most significantly, it preserved the account.

### Planning

All disposal facilities require various laboratory analyses. Standard turn around time for these tests is two to three weeks. This is also the typical lead time between tank removal contracting and actual mobilization for removal. The job should be coordinated so the testing is completed before mobilization. Such planning will expedite the clean-up and shorten the project duration by about three weeks.

Securing contaminated soil clearance at an approved disposal facility ahead of time allows the tank removal, soil digout and disposal to be done as one operation. This eliminates the need to return to the site at a later date to remove the contaminated soil. This is critical for speedy job completion and during the winter months to prevent the dug out soil from freezing into a solid lump. This single operation approach should be less costly than the tank removal - soil digout - stockpile - then return to loadout alternative.

Therefore, the most direct path towards expeditious site remediation requires soil testing. The specific next step following positive tank test results is shown in Table III.

### Prevention

So far we have covered steps that

follow a failed tank test. Because tank testing is generally performed by the buyer before a real estate transfer, the oil account is now at risk of being lost. What can be done to prevent an account from being subject to a tank test in the first place?

The first proactive choice is to work with the seller before he lists the property and convert the account to gas. This is the poorest choice for our industry. The quick gas conversion sale loses that account forever. Historically, this

choice has left our industry with a legacy of improperly closed tanks. These eventually come to light and by association tarnish fuel oil's name. Improperly closed tanks will continue to be a more significant public relations problem than active UST's as there is no direct financial assistance for hidden contamination if they leak.

Let's modify the first choice by limiting the offer of gas conversion services. Furthermore, when closing out an underground tank (in conjunction with

the gas conversion), rout out hidden contamination at that time, by offering only tank removals or soil investigations in conjunction with in-place closures. If a problem is discovered the financial hardship becomes an immediate consequence of the decision to convert to gas. This hardship merits less sympathy than that endured by the innocent property owner who later discovers an inherited problem. This approach turns the table on gas market's ruthless portrayal of oil heat as a polluter.

My second recommendation is for oil dealers to selectively encourage their customers to move away from old single walled steel underground tanks to basement tanks, above ground tanks, or double walled tanks. This must be done with great delicacy and finesse. It requires readdressing the underground tank situation from 'no problem' to 'eventual problem'. It requires action before the tank starts to leak. This minimizes the potential for cost overruns and wins greatest customer appreciation.

One approach already being implemented by some fuel oil dealers is a selective tank replacement program. An obvious limitation includes funding, however, where it is physically possible to install a 275 gallon tank, UST closure plus 275 installation should be at least 35% less expensive than a gas conversation. A dealer offered financing plan makes this approach affordable and most significantly, retains the oil account. Project costs should be in the \$1,800 - \$2,000 range. With an interest free finance plan spread over 12 months, payments of \$150 - \$167 per month should be affordable.

In short, prevent your customer's from failing an underground oil tank test by preventing it from happening in the first place. Eliminate the tank, take a proactive stance by replacing it and protect your customer from what the laws of physics inevitably deed him.

By honestly disclosing the limitations of steel UST's, then immediately offering an affordable solution, your customer will believe you care as much for their financial welfare as your own. Liken it to an automobile recall due to a faulty component. It is better to initiate the recall than to defend a lawsuit. In our case, it is better to initiate a proactive solution than to defend fuel oil's name as a polluter.

**F•N**

**Question:** What is the most thorough tank closure method?

**Answer:** Regulatory Bulletins 88-3 and 91-4 mandate acceptable closure techniques. These techniques fall into two categories: in-place closure (aka abandonment) and complete removal. *UST Line #5* addresses the choice of removal vs. in-place closure, recommending the latter as long as soils under the tank are tested. This *UST Line* introduces the "level of completion" concept, a big concern of homebuyers. This concept is applied to each of the closure techniques specified in Bulletin 91-4.

*Level of completion* is a measure of job thoroughness in terms of both environmental issues and future liability. This criteria of thoroughness or completeness is becoming a major factor in determining the best approach for dealing with a particular underground storage tank situation.

*In terms of completeness, removal is best, followed by open tank closure.*

*Removal vs. In-Place Closure.* Undoubtedly the most thorough job is done when the tank is completely removed. However, tank removal is equipment-intensive, which makes it costlier than in-place closure. It is also a very invasive procedure, particularly if a finished deck or walkway is over

or near the tank area. Surface restoration further complicates the job and raises the cost.

With tank removal, cost must be weighed against level of completion. Is the homeowner planning to sell the home? The closed tank left in the ground can be a stumbling block. Gone are the days when one could simply state that the tank was taken care of...today, the seller must provide certified evidence that the technique used to close the tank meets the intent of Bulletin 88-3 and, especially critical, *that the tank never leaked.* Tank removal offers the highest level of completion because the tank is now entirely eliminated.

In -place closure techniques fall into two categories: injection of concrete slurry or polyurethane foam down the fillpipe and pouring sand or gravel through a large opening. The former is completely non-disruptive, while the latter requires hand digging to the top of the tank, opening a 2' x 2' hole in the tank and actually entering the vessel. The cost of each approach is approximately the same. In terms of thoroughness, however, entering the tank is a far more complete approach because it allows the tank to be completely cleaned out of all sludge and residue and allows for leak inspection while inside.

<b>Closure Method</b>	<b>Best Application</b>	<b>Limitations</b>
Removal	Tank under dirt or lawn	Cost
Gravel Fill	Tank under dirt or lawn	Difficult where tank burial exceeds 42"
Sand Fill	Tank under dirt or lawn	Difficult where tank burial exceeds 42"
Concrete Slurry	Tank under buildings, footings or roadways	Cost & Low level of completion
Foam Fill	Tank under landscape, structures or walkways	Low level of completion