United States
Environmental Protection
Agency

Underground Storage Tank Technical Compendium References:

Release Detection

U.S. EPA Office of Underground Storage Tanks

The compendium contains interpretations and guidance letters sent out by the Office of Underground Storage Tanks. These references are cited within the underground storage tanks technical compendium at http://www2.epa.gov/ust/underground-storage-tank-technical-compendium.

Contents

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

December 19, 1988

Jack Horner
Horner Creative Products, Inc.
413 State Park Drive
Bay City, Michigan 48708-1338

Dear Mr. Horner:

This is in response to your letter to Ron Brand requesting a clarification of SPA's Final regulation for underground storage tanks as they apply to the "threshold value" for declaring a tank, system to be leaking using a precision tightness test. I understand there is some confusion on this issue. My response below is intended to clarify this matter.

To provide more clarity on this question. some background information is necessary," The Agency's tank testing results from the Edison, New Jersey Laboratory show that tank test results are affected by a large number of variables including temperature, tank deformation, vapor pockets, and other factors. Thus, even with a good method, several consecutive tests rarely yield identical results because of the interference or these variables, For example, if a large number of tests were conducted on non-leaking tanks, most of the test results would be close to zero but a few might be a good deal larger or smaller than zero. Therefore, if a tank leaking at exactly 0.1 gph was tested many times, the results would tend to be normally distributed around 0.1 gph. Some Of the measurements for a non-leaking tank may exceed those (or a leaking tank). The attached diagram illustrates this statistical reality.

When a tester goes in the field and conducts a test. as a service to the customer he must be able to make an informed decision about whether or not the tank is leaking. Usually this is done by comparing the test result to a threshold value, traditionally 0.05 gph. To be able to detect a 0.1 gph leak as required in the regulation (at a statistically reliable level of confidence) the threshold must be smaller than 0.1 gph. The correct threshold to meet the regulation depends on the test method. but if the results are distributed evenly (as shown in the illustration attached), the correct threshold is 0.05

gph Thus, the only difference between the regulation and the existing industry practice (NFPA 329) is that the regulation more clearly establishes that at this threshold only leaks of 0.1 gph and greater will be reliably detected As is noted in the preamble to the regulations (53 FR 37145), a threshold value of 0.05 gph should be used unless the manufacturer has determined a different threshold value for his particular method.

I hope this has provided the clarification you need. It you have further questions please contact Tom Young directly at 2O2-475-7261.

Sincerely,

Jim McCormick, Director
Policy & Standards Division
Office of Underground Storage Tanks

cc: Gerald Phillips, Region 5 Program Manager

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

June 22, 1989

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

Ms. Judith Spray
Pollulert Systems
Emhart Electrical/Electronic Group
P.O. Box 706
Indianapolis, IN 46206-0706

Dear Ms. Spray:

This is in response to your letter requesting a clarification of the Federal regulations relating to leak detection for pressurized piping at underground storage tanks. You asked if annual line testing is required if system has a permanent line monitoring device.

There are two basic ways for an owner of a tank with pressurized lines to meet the requirements of 280.41(b)(1)(ii):

1. Have an annual line tightness test that meets the standards of 280.44(b) and combine them with an automatic line leak detector capable of shutting-off or restricting flow if a leak is detected of 3 gallons per hour at 10 pounds per square inch line pressure within one hour. However, if an automatic line monitoring device meets the performance standard for a line tightness test, that it "can detect a 0.1 gallon per hour leak rate at one and one-half times operating pressure," then it can be used to substitute for the annual line tightness test.

2. Vapor, groundwater, or interstitial monitoring may be also performed monthly in accordance with the standards in 280.43(e), (f), and (g) as a substitute for the annual line test.

Therefore, the answer to your question is that permanently installed pressure, vapor, groundwater or interstitial monitors may be used in place of annual line tightness tests as long as these methods meet the applicable performance standards. In all cases, automatic line leak detection capability must be provided with pressurized lines.

I hope this has answered your question regarding the regulation. If I may be of further assistance please the contact me.

Sincerely,

/s/

Thomas Young
Standards Branch
Office of Underground Storage Tanks

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

February 28, 1990

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

Mr. Michael Bouton
Tracer Research Corporation
3855 N. Business Center Drive
Tucson, AZ 85705

Dear Mr. Bouton:

This is in response to your request for clarification of the federal regulations relating to leak detection for pressurized piping at underground storage tanks. You asked about how to convert a leak rate at one operating pressure to an equivalent leak rate at another operating. pressure.

As stated in the preamble to the final regulations (53 FR 37167) "A manufacturer can test a device at any convenient operating pressure and mathematically convert the results to 10 psi to determine if the device meets the performance standard." This statement also applies to the requirement to detect a 0.1 gallon per hour leak at 1.5 times operating pressure (280.44(b)). EPA believes that the appropriate formula for the conversion is that the leak rate is proportional to the square root of the pressure drop ratio. Thus, a device that operates at operating pressure must be capable of detecting a leak rate of 0.08 gallons per hour to meet the performance standard of 280.44(b).

I hope this has answered your question regarding the regulations. If I may be of further assistance please contact me.

Sincerely,

/s/

Thomas Young
Standards Branch
Office of Underground Storage Tanks

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

July 19, 1990

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

Mr. Bill Birdwell
Executive Vice President
Tanknology Corporation International
5225 Hollister Street
Houston, Texas 77040-6294

Dear Mr. Birdwell:

This responds to your June 29 letter requesting clarification about EPA's underground storage tank (UST)requirements for release detection of pressurized lines from the tank to the dispenser. Your specific question was whether such pressurized lines at UST sites that have monitoring wells around the tank pits, but not along the piping runs, must also have an annual line pressure test.

As you probably know, under the EPA UST requirements (and Florida's, I believe) all existing pressurized lines must have emergency shut-off, flow-restrictor, or continuous alarm systems by December 22, 1990. That must be backed up by a monthly monitoring method or an annual line test. The location and number of monitoring wells must be sufficient to detect releases from any portion of the tank system that routinely contains product (Section 280.43 (F)(7)). Thus, if a tank excavation is intercepted by observation wells, but a pressurized line system extends beyond the designed reach of those monitoring wells, then an annual line test (or same other acceptable method of monthly detection) is in order. The intent of our release detection requirements is to identity a release quickly before it becomes a significant corrective action.

I cannot reliably speak to Florida's requirements. However, a site with fractures and fissures or surrounded by silts and clays would not appear to meet our requirement for using groundwater monitoring only in course to medium sands, gravel, course silts, or other similarly permeable materials (Section 28O.43(f)(2)). The point of the site requirement is to assure that a release makes its way unimpeeded to the monitoring well.

I hope this information is helpful to you. I suggest you contact Marshall Mott-Smith with any questions about the Florida UST requirements at (904) 461-3935.

Sincerely,

/s/

David O'Brien, Chief
Standards Branch
Office of Underground storage Tanks

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

May 10, 1991

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

Ms. Deborah Talanian
Manager, Marketing and Customer Service
Entropy Limited
South Great Road
Lincoln, MA 01773

Dear Ms. Talanian:

This responds to your request of April 16, 1991 for confirmation that a statistical inventory reconciliation method (SIR) can be used to comply with the Environmental Protection Agency's requirements for release detection on underground storage tanks (UST), including associated piping.

It is my understanding that SIR methods (like Entropy's) compare tank volume inputs to outputs and evaluate several months of data to determine if there exists any statistically-significant discrepancies (including leaks). Because this analysis must include the use of the metered product dispensing records, it is generally a "tank systems" test that should also detect leaks from the piping system. Thus, if properly performed for any particular site, an SIR method that demonstrates a general performance under the EPA protocols to the standards in the rules may be an acceptable alternative to periodic line tightness testing. I must offer two caveats, however.

First, I have some doubt SIR methods can be shown to be a substitute for monthly monitoring because the detection results must be updated and available on a month to month basis should an inspector come by and visit the site. Of course it may be an acceptable equivalent to the daily inventory/periodic tightness test method allowed in the rules, as long as the owner and operator maintains on-site the last year's worth of daily inventory records reconciled for the latest month.

Second, UST systems with pressurized lines must still have catastrophic line leak detectors able to detect a 3 gpa leak at 10 psi. Inventory control is not an effective substitute for such emergency shut-off, restricting, or alarming equipment.

I hope the above information is complete and helpful to you. Thank you for your patience in awaiting my response.

Sincerely,

/s/

Dave O’Brien, chief
Technical Standards Branch
Office of Underground Storage Tanks

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

July 25, 1991

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

MEMORANDUM

SUBJECT: What Constitutes the Portion of the Underground Tank that "Routinely Contains Product"

FROM: Dave O'Brien, Chief /s/
Technical Standards Branch
Office of Underground Storage Tanks

TO: Leslie Zawacki, Acting Program Manager
Region VIII UST Program

It has recently Come to my attention that a regulatory interpretation memo (copy attached) was provided to you by this Office on June 26, 1991 concerning the issue of whether an in-tank monitor may be used as a "precision-test" and would suffice for the purpose of complying with requirements for the initial tightness test mandated at all new UST installations. The conclusion reached about that issue in the earlier memo is correct for use as guidance at the time of installation: an in-tank monitor, when set in the test mode meets the new tank installation requirement for performing a precision test if it achieves the 0.05 gals/hour NFPA standard and tests all portions of the UST system up to the level of the tank's interior that is immediately below where the overfill prevention equipment would be triggered. Unfortunately, some of the rationale provided in support of this interpretation was incorrect and inadvertently raised another issue that is at the heart of the release detection regulation. The following additional discussion is therefore provided primarily to clarify this other issue: for purposes Of EPA leak detection requirements what constitutes the portion of the tank that routinely contains product?

The phrase "routinely contains product" is used in the regulations to describe that portion of the tank system that at a minimum must be covered by the release detection method used. This language was added to the final rule primarily to implement EPA's stated intent to allow the use of numerous methods of detection to meet our leak detection requirements, such as Partially-fil1ed in-tank level sensors, statistical inventory reconciliation (SIR) services, and non-volumetric methods (e.g., in-tank acoustic

testing or tracer techniques). Our findings from EPA's causes of releases studies done in support of the final regulation revealed that even old bare steel tanks (the worst case scenario) only rarely, if ever, leak in the top third of the tank (except at the bungs and fittings on the tank top which are the target of the overfill prevention requirements). Therefore, EPA has determined it is protective of human health and the environment to be somewhat flexible about what portion of the upper part of the tank must be tested so that UST owners and operators can take full advantage of the different types of release detection available in the marketplace.

The "routinely contains product" language fosters the use of several different methods of release detection in basically two ways. First, it makes clear that detection methods can be used that do not test the vent pipes, fill pipes, and fittings on top of the tank–EPA has mandated that these areas in the future do not "routinely" contain product through compliance with the overfill prevention requirements. As a general engineering approach EPA decided it was preferable to prevent product from getting to those upper portions of the tank system rather than trying to prevent leaks at the tank's top by making sure that the fittings continue to remain tight over the tank's operating life. Second, the language also provides some flexibility as to what portion of the tank vessel below the fittings must be checked by the leak detection method used. Because different detection methods operate on different principles and have different capabilities, we did not want to unnecessarily restrict release detection to only those methods that always test the complete tank shell's integrity. We certainly did not intend to restrict tightness testing to only those methods that test the integrity of the shell up to the level of the overfill prevention triggering device (as was incorrectly stated in the June 26 memo).

The following are some simple "rules of thumb" to use in determining whether the portion of the tank that "routinely contains product" has been adequately tested by the release detection method used:

(1) With some non-volumetric test methods, the level of the product in the tank does not impact the release detection method's performance capabilities. Thus, for purposes of EPA's regulation, the level of liquid in the tank vessel at the time of the test is not of concern, (for example, acoustical methods and statistical inventory reconciliation services (SIR)).

(2) For automative tank gauging equipment, the liquid level in

the tank at the time of the test must be appropriate for the method to be able to detect the required minimum leak rate with a probability of detection of 0.95 and a probability of false alarm of 0.05. Particularly in larger tanks, the further down the liquid level is at the time of the ATG's test the more difficult it is to achieve the required performance standard. (Any in-tank level monitoring method installed after 12/22/90 must be backed up by an evaluation of that method's performance following EPA's evaluation protocol and the results of the evaluations should specify any limitations of the use of the method including the level at which the required leak rate performance was achieved on the test tank.

(3) The major in-tank level monitoring service providers most often specify in the methods' stated protocols that their practice is to test almost the complete integrity of the tank, including up very near to the top of the tank (85% to 95% full). This is considered by EPA as meeting the "routinely contains product" provision in the regulations.

(4) At the time of final rulemaking EPA was also aware of numerous small businesses (with low levels of product sales) who were reported to purposefully maintain low product inventory levels as part of their normal business routine. Therefore, EPA concluded that it is unduly restrictive to limit test methods to only those approaches that test nearly the complete tank's integrity (and would require a small business owner to order an unusually high volume of product to assure testing of the upper portions of the tank that would otherwise rarely ever be called upon to store product). In these types of situations, when an on-site inspection is conducted, the inspector might include a quick check of the required inventory records to determine if in fact the tank is routinely being filled (i.e., not just on a rare occasion) significantly above the liquid level at which the tank test was conducted.

cc: OUST Management Team
Desk Office Team

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

June 26, 1991

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

MEMORANDUM

SUBJECT: Automatic in-Tank Monitors

FROM: Dave O'Brien, Chief /s/
Technical Standards Branch
Office of Underground Storage Tanks

To: Leslie Zawacki, Acting
Region 8 UST Program Manager

I am providing the following interpretation in response to Region 8's question as to whether an in-tank monitor in the test mode may be considered a precision test and, if yes, would this test suffice for the requirement of performing a precision test at new tank installation?

Our regulations, at 280.20(d), require that "all tanks and piping must be properly installed in accordance with a code of practice developed by a nationally recognized association..." The regulations go on to list API Publication 1615 as an acceptable code of practice. API Recommended Practice 1615 (section 10.6 Final Testing), states "Conduct precision test (see 1.3.23) of all tanks and piping after all paving over the tanks and piping has been completed and before the system is placed in operation." Section 1.3.23 defines a precision test as "a test of the liquid-product-handling portion of an underground storage tank system, or a portion of the system that meets the criteria of NFPA 329." NFPA 329 states that the test should be capable of detecting a loss of .05 gallons/hour.

The regulations also require that t tightness test, which is analogous to the precision test in NFPA 329, incorporate all portions of the UST system that routinely contain product. Thus the automatic in-tank monitor must test all portions of the UST system that are not protected by the overfill protection device, i.e., the UST must be filled with liquid to the level immediately below which the overfill device would be triggered.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

April 6, 1990

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

Ms. Priscilla Young
American Petroleum Institute
1220 L Street, NW
Washington, DC

Dear Ms. Young:

Thank you for your letter of January 12, 1990, regarding the use of manual tank gauging as the sole leak detection method for tank of 1000 nominal capacity. We have carefully reviewed the calculations you submitted and have concluded that, when conducted in accordance with the procedures described in the attachment, manual tank gauging meets the performance standards in 40 CFR 280.43(h)(1) for tanks of nominal capacity of 1000 gallons or less. Thus, for tanks of this size manual tank gauging can be used as the sole means of meeting the leak detection requirements.

If you have any questions regarding this response please give me a call.

Sincerely,

/s/

Ronald Brand, Director
Office of Underground Storage Tanks

Attachment

Requirements for manual tank gauging for 1000 gallon tanks

In order to meet the performance standard for "other methods" in 40 CFR 280.43(h)(1), manual tank gauging must meet the following requirements:

1. Tank liquid level measurements are taken at the beginning tha ending of a time period during which no liquid is added to or removed from the tank. The appropriate time period is listed in the chart below;

2. Level measurements are based on an average of two consecutive stick readings at both the beginning and the ending of the period.

3. The equipment used is capable of measuring the level of product over the full range of the tank's height to the nearest one-eighth of an inch;

4. Testing must be conducted at least once a week and four weekly results must be averaged to obtain a monthly result. A leak is suspected and subject to the requirements of Subpart E if them variation between beginning and ending measurements exceeds the weekly or monthly standards in the following table:

Nominal tank capacity and dimensions	Weekly standard (one test)	Monthly standard (average of four tests)	Minimum test duration
1000 gallons (64" x 73")	9 gallons	4 gallons	44 hours
1000 gallons (48" x 128")	12 gallons	6 gallons	58 hours

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MARCH 5, 1992

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

MEMORANDUM

SUBJECT: Clarification of "Catastrophic" Leak Detection
Requirements for UST systems with pressurized Delivery Lines

FROM: David W. Ziegele, Director
Office of Underground Storage Tanks

TO: Regional Program Managers
Regional Branch chiefs

It has been brought to my attention recently that some confusion exists within the pipeline leak detection community regarding whether or not EPA requires quantitative annual performance tests of mechanical and electronic line leak detector. ("LLDs") on all pressurized piping at UST sites. Section 280.44(a) of the UST technical rules requires owners and operators to test the operation of all USTs annually in accordance with manufacturer requirements. The same section of the rules also cites the need for such devices to detect leaks of 3 gallons per hour (gph) at 10 pounds per square inch (psi) within 1 hour. The purpose of this memorandum is to clarify what kind of annual test must be performed on LLDs under the rules.

The question of what constitutes an annual equipment test is an important one, because we estimate there are somewhere between 500,000 to 750,000 pressurized lines at UST sites nation-wide. This issue was initially addressed in an August 12 memo prepared by Randy Nelson, Region VII, with the cooperation of David Wiley from OUST, that was distributed to all the Regions (see Attachment I). However, they both attended a November 18-19 ASTM meeting in Kansas City on pressurized line testing where it was obvious that while all in attendance had seen Randy's memo, some members of the leak detection provider industry still persisted in their contention that EPA requires (or at least should require) a once-a-year quantitative performance test of all LLDs in the field.

Provided with this memorandum im a brief technical analysis of the rule's leak detection requirements for pressurized lines (Attachment II). I believe you will agree that it reflects our original intentions during promulgation of the technical requirements for line leak detectors. It also supports with Randy Nelson's earlier interpretive findings in this area, that:

(a) Any model of LLD installed after September 22, 1991 must have been evaluated

according to EPA's standard test procedure. The evaluation, usually performed by a third party, must find that a typical out-of-the-box LLD is able to detect, at a minimum, a leak at 3 gph at 10 psi within 1 hour, with a probability of detection of 95% ant a probability of false alarm of 5%.

(b) The annual test of the LLD is an operational, as opposed to quantitative, verification that the LLD is functioning in the piping system. The annual test is not intended to show compliance with the above evaluation performance standard. There are no quantitative or performance test requirements for an installed model of LLD that passed the evaluation. The annual test should be performed to assure that the LLD is installed in the line properly, not being tampered with, being maintained, and operating within the manufacturer's specifications.

We found some good news in the compilation of some recent pressurized line tightness testing data which suggests that when the regulatory approach we promulgated (and further explain in this paper) is complied with, it appears to be having the desired positive effect in protecting human health and the environment: properly managed pressure lines are leaking less than 0.5 percent of the time, usually at substantially less than 1.0 gals/hour. This is a vast improvement over the 10 percent leakage frequency and the too frequent catastrophic leak rates reported prior to final rule promulgation.

Unfortunately, even in the face of such good news, some service providers in the leak detection community continue to argue the need for annual, in-the-field quantitative performance tests of all LLDs. At this time, I do not see any need for such tests.

In response to the present confusion, I intend to share the findings shown on the attachments with the wider leak detection community. Towards that end, I am mailing a copy of the attached analysis and rule interpretation to each of the three providers of mechanical line leak detectors. Also, I am providing this information to Bob Renkes, Executive Director of the Petroleum Equipment Institute, for summary in PEI's TulsaLetter. We have prepared an Environmental Fact Sheet (Attachment III) summarizing the issue and we are sending copies according to our standard distribution.. If you have requested that materials go through you, please pass on the enclosed copies of the fact sheet to your state contacts

If you have any questions about this letter please Contact David Wiley at (703) 308-8877 or Randy Nelson Region VII at (913) 551-7220.

Attachments

cc: Roy Bennett, President
Vaporless Manufacturing Inc.

Robert L. Besson, President
The Marley Pump Company

Gene Mittermaier, Manager, New Product Development

Tokheim Corporation

Bob Renkes Petroleum Equipment Institute

bcc: John Van Daele
Tokheim Corporation

AUGUST 12, 1991

MEMORANDUM

SUBJECT: A Technical Update on "Catastrophic" Line teak Detectors and the UST Regulations

FROM: Randy Nelson, Senior Environmental Engineer,
State Programs Sections, EPA Region VII

TO: Distribution List

It has recently been brought to our attention that there is presently a great deal of contusion about how EPA's release detection regulations for underground storage tanks (USTs) apply to the "catastrophic" line leak detector (LLD) that must now be in place on all pressurized lines attached to USTs. Widespread confusion about how to interpret EPA's requirements as they apply to LLD's has been reported among manufacturers, owners, testers, and the state regulators. This brief memo is intended to clarify and update you on the Office of Underground Storage tank's (OUST) regulatory interpretations and recent activities on this subject. This information has been developed in cooperation with OUST.

Statement of Problem

A major source of the confusion about LLD's and their associated EPA requirements appears to stem from the fact that several line tightness testers are now reportedly offering and providing services in the field that not only test the tightness of pressurized lines (at the 0.1 gals/hour minimum leak rate on an annual basis as required by the regulations) but also to test the leak threshold performance capabilities of the catastrophic LLDs at the site. There appears to be a wide-spread but incorrect belief that EPA regulations require such field performance testing of the LLDs at the time of the required annual tightness test of the lines. The UST regulations require that the performance of the LLDs be checked annually in accordance with the manufacturer's requirements.

Summary of EPA's Requirements for LLDs

Very simply, EPA's regulations in 40 CFR Part 280 Subpart D require that LLDs must be:

(a) installed on all pressurized piping that connects to an underground storage tank (see 280.41(b)(1));

(b) operational and functional and capable of detecting a catastrophic leak, including an annual test in accordance with the manufacturer's requirements (see 250.44(a); and

(c) certified by a third party testing organization to be able to perform "out of the box" to EPA's standards of 3 gph at l0 psi, with a probability of detection of 0.95 and

probability of false alarm of 0.05 if the LLD is installed after September 22, 1991 (see 280.40(a)(3); 55 Federal Register 26, published January 2, 1991; and EPA's recommended line leak detection evaluation protocol).

Discussing each of the above points in turn:

Federal Regulations require line leak detection on all pressurized piping from underground storage tanks. The most popular type of LLD is designed to test the piping for a large leak every time a submersible pump is turned on and off. If the line is leaking, the LLD will restrict flow from the pump and/or sound an alarm alerting the attendant there is a problem with the piping.

The LLD must be in place and in working order and its intended function must not be altered In any way. The functional element of the LLD must be active and have the ability to sound an alarm or restrict the flow of product in the pipe if a leak is detected.

An LLD installed after September 23, 1991 must have had its leak detection ability evaluated and certified by a third party according to an accepted protocol for LLDs. Manufacturers of LLDs are responsible for obtaining the certification and the quality control of subsequently manufactured LLDs. A new LLD (out-of-the-box) must be capable of detecting a 3 gallon per hour leak at 10 psi with a 95% probability of detection and a probability of false alarm of 5%. Once a LLD is installed in the field there is no EPA rule requiring a test to determine if the LLD can detect a 3 gallon per hour leak, but the LLD must be checked on an annual basis in accordance with the manufacturer's instructions.

The Unsettled Issue of LLD Field Performance

The EPA is presently gathering and reviewing pressurized line testing data to examine if perhaps routine field testing of the LLDs detection threshold may be necessary to protect human health and the environment and, if so, what is the minimum level of detection that a field-installed LLD must be capable of demonstrating in a field performance test. Unlike some of the other regulated portions of an UST system, LLDs have moving parts that are subject to wear that may cause degradation of the LLD's performance over time. It is simply not clear to EPA at this time what level of degradation in the field will cause LLDs to not catch the "catastrophic" types of Leaks that occurred in the past at UST sites (and that we are trying to regulate). Therefore, OUST is conducting a quick field study of this question that includes the collection of line leak performance data and interviews of experience field personnel.

Based on the results from this on-going study, OUST will provide further guidance in the future about the level of detection an installed LLD must be capable of detecting in the field. Some possible options include proposing EPA regulatory changes; turning to consensus code making bodies (such as ASTM or PEI) for standard-setting assistance; or simply continuing with the current requirement of annually checking LLD field performance "according to the manufacturer's requirement". The latter approach (no action), for example, would be protective of human health and the environment if the study results show that catastrophic line leaks are typically manifested in a way that will be quickly detected, even by equipment that has degraded through use

overtime.

Caution About Evaluation of LLD Field Performance

The equipment currently being used to test and evaluate the performance of LLDs in field has generally not been scrutinized by EPA or a consensus code making body. Therefore, the results of voluntary tests of this nature should be viewed with caution. Many of these field-test-devices have been designed and utilized on an ad-hoc basis to evaluate LLD performance but have not been shown to reliably accomplish this task according to some independent or established consensus guideline (most likely because-no guideline exists that we know of). EPA will be discussing the need for such guidelines with appropriate code making bodies after the above-mentioned EPA study is completed.

If you have any questions about the above technical information please contact me at, Region VII, FTS 276-7220, Dave Wiley, OUST, at FTS 398-8877, or Joe Womack, Region VI, at FTS 255-6755. These are the EPA employees on the line leak detection team working on this issue

cc: EPA Regional UST Program Managers

ATTACHMENT II

Automatic Line Leak Detectors Paper

1. What are (Catastrophic) Line Leak Detectors (LLDs)?

2. Background/Purpose of the LLD Requirement

3. The LLD Performance Standard (3gph/10psi @95 &05)

4. Annual Test of the LLD's Operation

5. Summary/Conclusions: “So What is Required by EPA?”

Appendix I - Data and Analysis

Appendix II - ASTM Efforts

1 What are (catastrophic) Line Leak Detectors (LLDs)?

The following description was provided by the American Petroleum Institute in their July 15, 1987 comments on the proposed rule. It is repeated here because it is a good summary of the flow-restrictor type of LLDs:

"Mechanical Line Leak Detectors (MLLDs), which work in the following manner. When the dispenser is activated product flows through the detector at a rate of 1.5 to 3.0 gallons per minute. This causes the pressure in the pipe to increase rapidly to 8 to 10 psi. This increase in pressure actually pushes the valve in the leak detector toward a shut position, restricting the flow to a rate of 3 gallons per hour. If there is a leak in the system of 3 gph or greater at 10 psi, then the pressure will not increase further and the flow will remain restricted. If there is a leak of lesser magnitude, then the pressure will build slowly, though it will eventually reach full operating pressure. If the system is tight, then the pressure will increase rapidly. As the pressure goes above 10 psi, the valve is forced to its fully open position, and the system is in operation. The valve remains open until the pressure in the line drops below 1 psi."

Since the time the rule was formulated, electronic LLDs have emerged in the market. Though electronic LLDs are not subject to the same types of wear and tear as mechanical devices, the following discussions cover all LLDs.

(b) Background/Purpose of the LLD Requirement

As stated in the preamble to the final rule (53 fed. Reg. 37153 (1988)), LLDs were required by EPA in the belief that their use which eliminate 80 to 95 percent of the volume of releases occurring from underground piping at UST sites. As stated in the EPA Causes of Release report done in support of the final rule, the consensus from the field experts was that releases from pressurized lines without LLDs can result in large, “overnight” catastrophic releases that typically range in size between 600 and 6,000 gallons. Also cited in the report was a meeting with nine experienced installers who could together easily recall over one hundred and fifty such incidents. While the field experts were not sure exactly how LLDs functioned, they did observe that they successfully detected catastrophic leaks, particularly if the device was kept in operating condition and was checked periodically so that its use was not tampered with or overridden by the UST owner or operator. These claims were corroborated by numerous other commenters. EPA's faster phase-in of the use of LLDs in the final UST rule was intended to curtail these catastrophic, or run-away, releases from pressurized lines.

The use of LLDs was also anticipated by some commenters as having the added benefit of detecting and enabling curtailment of releases even much smaller than 3 gph. One commenter (UST2-1-CO-413A) provided calculations showing how even relatively small leaks (significantly less than 3gph) will noticeably extend the LLDs cycle time in its test (flow restriction) mode well beyond the normal cycle of 2 seconds, particularly when beginning to first operate the pressure line system each day. These delays are noticed by customers who alert the UST owner that there may be a problem in the line. One very experienced contractor (UST2-3-SB-45) estimated that LLDs would cause detection of over 80% of the leaks in pressurized lines in this manner. Many of these commenters agreed with the Agency's final rule decision to back up LLDs with a more rigorous once-

a-year line tightness test to catch the rest of the smallest leaks.

In sum, the general consensus was that LLDs are crude but effective devices for curtailing catastrophic releases from pressurized lines, provided they are periodically checked and assured to be in operating condition. There were some questions about how these devices worked, but very little doubt expressed about their ability to detect catastrophic leaks early, provided they are maintained in good working order.

(c) The LLD performance Standard
(3gph/10psi @95/05)

As discussed in the final rule's preamble and the summary and response document, several commenters stated that line leak detectors that restrict flow of product were unable to meet the proposed 2 gph criterion. Based on an evaluation conducted by EPA'S office of Research and Development and a commenter-supplied evaluation of several LLDs, the Agency established the standard as 3 gph at 10 psi, with a probability of detection of 0.95 and a probability of false alarm of 0.05. At the tine of final rule, method providers did not have a means to obtain this type of performance information for each method. Thus, the 95/05 portion of the standard was delayed for two years. In effect, method providers were given 2 years to develop method-specific performance data and, if necessary, modify their methods so that they could meet the EPA standard.

EPA completed and distributed a final method performance evaluation protocol, titled Standard Test procedures for Evaluating Leak Detection Methods: Pipeline Leak Detection Systems, in October 1990. The compliance date on the 95/05 portion of the standard was pushed back by EPA 270 days (or until September 22, 1991) to enable method providers to evaluate and distribute method-related performance data using the standard results-reporting sheets in the recommended protocol (56 Fed. Reg. 24 (1991)). As stated on page 2 of the protocol, the performance estimates that result from conducting the protocol on a particular method enable them to be easily compared to the technical standards prescribed in the EPA final regulation. Similar to the other protocols, the recommended evaluation for piping detection methods “is not designed to determine the functionality of the system (i.e., whether it operates as intended), nor is it meant to assess either the operational aspects of the system (e.g., the adequacy of the maintenance and calibration procedures) or the robustness of the system." In other words, for each method it is a one-time, out-of-the-box test on a representative piece of equipment. It does not have to be repeated on each new piece of equipment built at the factory to the same specifications.

4. Annual Test of the LLDs Operation

Section 280.44(a), in addition to stating the 3 gph/10 psi performance standard, also requires "an annual test of the operation of the leak detector...conducted in accordance with the manufacturer's requirements." The final rule's preamble points out (on page 37167) that this requirement was added in response to commenters' concern that line leak detectors can "malfunction or be overridden by unwise operators." The Agency's supporting summary and response to comments document (page 12-5) further identifies these commenters' concerns that there is a need for such maintenance checks because of "the possibility that the equipment could fail or that operators

could shut them off." Some of the specific concerns cited by commenters included:

(a) "our experience is that many operators disconnect these devices because of the fear of offending customers should the device trip and restrict flow... (inspection) will insure operational integrity... to see if they are working." (UST2-3-CO-56)

" "An annual check to determine if the LLD is functioning properly..." (UST2-3-CO-62)

" "It is our experience that if LLDs are not maintained annually, then a significant percentage will fail to function as designed." (UST2-1-PHC-3-A)

" "...to ensure that they are in working condition." (UST2-3-LC-26)

" "A simple self test... to determine that the internal circuitry and overall unit remains functional..." (UST2-3-CO-19)

Most of these commenters also expressed reservations about EPA establishing a performance standard for LLDs and certainly did not express the need for an in-the-field quantitative performance check. A check for equipment operability, to determine if it was turned off or otherwise tampered with was clearly what these commenters had in mind. Is it hooked up and in working order? Has it been circumvented by the operator? Is it broken? These are questions meant to be answered by EPA's required annual test of the equipment's operation. The fact that some line tightness testers now claim to have developed various methods for conducting quantitative measurements of equipment performance in the field is an interesting and potentially valuable improvement in technology. However, it is not something required by EPA's annual test of the operation of LLDs.

Summary/Conclusions: "So what is required by EPA?"

As provided in more detail on page 23 of OUST's "straight Talk on Tanks," each pressurized piping run must be equipped with an automatic line teak detector, backed up by an acceptable monthly detection method or an annual line tightness test (conducted at 0.1 gals per hour).

All automatic line leak detectors, including mechanical and electronic, must be able to detect a leak of at least 3 gph at a line pressure of 10 psi within one hour. All LLDs installed after September 22, 1991 must also be able to meet the more stringent EPA requirements for detection performance (a probability or detection of 0.95 and a probability of false alarm 0.05). Demonstration of compliance with the performance standards (and the statistical probabilities of performance) can be accomplished by a one time test conducted on a typical piece of equipment "out-of-the-box" using the recommended EPA evaluation protocols. It is EPA's understanding that all the major manufacturers of line leak detectors are able to provide proof of such performance to all UST owners and operators using the major methods now on the market.

The operation of all automatic line leak detectors must also be checked once a year. This test must assure that the equipment is properly installed in the line, is not tampered with or being bypassed, and is not broken or otherwise outside of the specifications/requirements provided by the

method's maker.

Annual quantitative performance tests of each piece of equipment installed in the field are not required by EPA's standards. such tests are voluntary, and once standardized, may become a good industry practice. However, such field test results that indicate more than 3 gph LLD performance on a line in the field do not necessitate automatic equipment replacement under the EPA requirements. Manufacturer requirements should be followed to determine if the equipment is actually broken and operating outside of the equipment's normal range of tolerances and specifications. For example, if a LLD fails to detect a 3 gph leak at 10 psi, but detects a 4 gph leak at 10 psi the owner is in compliance with EPA regulations, provided the owner is in compliance with the manufacturer's requirements.

Recent data collected by EPA from some 3,500 line leak tests (tee appendix I) indicated that LLDs properly applied in accordance with the above EPA requirements appear to ha doing the job they were intended to do: eliminating catastrophic leaks and causing earlier detection or smaller leaks (through noticeable, extended equipment cycling times).

Appendix I - Data and Analysis

Overview: In the fall of 1991, five companies which test pipelines and mechanical line leak detectors (LLDs) provided recent data from approximately 3500 separate tests from around the country. The vast majority of LLDs installed are "Red Jackets," manufactured by Marley Pump.

Conclusions on the sample data:

Pressure pipelines

- Less than 1% of lines were reported leaking.
- Size of leaks: either less than 0.3 gallons per hour at approximately 50 pounds per square inch, or so large as to be "unable to hold pressure".

LLDs

- There is a wide variation in the rates of rejection in the field of in-service (vs. new) mechanical LLDs depending on the equipment and procedures used. Red Jacket Piston Leak Detector reject rates vary from 5% to 54%.
- During annual field performance tests, a large number of Red Jackets fail at 3 gph at 10 psi, but pass at 4 gph at 10 psi (31% in one survey of 605).
- Out of 1 tester's 59 rejected LLDS, only 1 LLD failed to actuate at flowrates greater than 8 gph @ 10 psi. Most failed to trip between 6.0 and 7.0 gph.

Inferences on the population as a whole:

Pressure pipelines

- Line leaks in range of 1.0 gph to 10.0 gph at line pressure (~30 psi) are rare. Either lines "weep" or they leak at much higher flowrate.

LLDs

- LLD performance degrades to values above 3 gph @ 10 psi, but not beyond 8.0 gph. They wear down, but not out.
- Wide variation in failure rates among test methods could be reduced if testers' equipment and procedures adhered to an industry standard.

Appendix II - ASTM efforts

An industry advisory task force has formed to study the subject of catastrophic underground pipeline leak detection, and to recomend an approach for testing line leak detectors (LLDs), This group is under the auspices of ASTM Subcommittee on Storage Tanks (E-50.01), and was formed in response to concerns over the wide variation in the way mechanical LLDs are flow tested in the field. Such field testing is currently not covered by either an EPA protocol or a nationally recognized consensus code. The work product(s) of this task force could serve as the basis for an ASTM approved standard.

The ASTM task group membership includes manufacturers of mechanical and electronic LLDs, experienced end users, testers, consultants, and EPA. The group has agreed to concentrate on basic technical requirements and on the variables (such as viscosity, temperature, piping, bulk modulus, etc.) encountered in the field in testing the performance of LLDs. For example, a method should be able to test a LLD in the line, as well as out of the line. The group will not address either the field test performance standard (which EPA has been asked to clarify) or LLD design and test procedure details (which must be left up to manufacturers).

If an ASTM Standard is approved, it could be used by manufacturers and testers as the minimum technical requirements that their specific testing equipment and procedures must meet when evaluating LLD performance in the field. The potential benefits of an such a Standard are several A practice on this subject will, at a minimum, promote a nationwide consistency of field testing among all methods and thereby provide comparison of equipment performance as well as an empirical basis for further equipment improvement. Since this effort addresses how testing is done, it is separate from EPA's clarification of what regulatory standard testing must meet.

(OS-410WF) :DObrien:drw:678-8877:12/2/91:DISC#MacHD:LLDInApp

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

July 9, 1992

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

Mr. John Hendershot
World Enviro Systems, Inc.
P.O. Drawer 789
Shawnee, Oklahoma 74802

Dear Mr. Hendershot,

This is to respond to your attached letter of March 19, 1992, requesting "EPA's acceptance of the World Enviro Systems, Inc. flexible membrane internal containment/vacuum monitor system for single wall steel or fiberglass tanks as secondary containment with interstitial monitoring..." Unfortunately, EPA does not test, certify, or approve specific brands or products. What follows, however, is a clarification on how EPA's underground storage Tank (UST) regulations apply to the type of system described in your letter. It has been reviewed by representatives of EPA's Office of General Counsel, and of State and EPA Regional UST programs.

In summary, flexible internally fitted liner systems can be shown to meet the Federal requirements for release detection (but not for upgrading or repairing) for both petroleum and hazardous substance USTs if certain conditions are met. Please refer to the discussion below.

Background

Based on information you have provided, our understanding of the type of system at issue is as follows. The system includes a flexible non-metallic internally fitted one piece liner. This liner is situated inside a steel, fiberglass-reinforced plastic or composite UST, and covers the entire inner surface of the tank. There is continuity throughout the interstitial space such that both vapors and liquids can migrate from any part of the interstice to another. The system maintains a vacuum in the interstitial space and triggers an alarm when conditions indicate a breach in any portion of either the liner or in the tank outside the liner. Piping is not addressed by the system.

We further understand that there are currently no codes of practice or standards developed. by nationally recognized associations or independent testing laboratories for the design, construction, installation, testing, or maintenance of flexible liners specifically for the storage of petroleum or other regulated substances.

Our clarification is based on the above understandings and may not apply to other types of systems. Also, please note state and local requirements can differ from EPA's.

Release detection for petroleum underground storage tanks

Internally fitted liners are specifically addressed in section 280.43 -"methods of release detection for tanks." Section 280.43(g) allows interstitial monitoring to be used if the system is designed, constructed and installed to detect a leak from any portion of the tank that routinely contains product, and 280.43(g)(3) allows internally fitted liners, provided that "[f] or tanks with an internally fitted liner, an automated device can detect a release between the inner wall of the tank and the liner, and the liner is compatible with the substance stored." Compatibility is also required in Section 280.32, which requires that "owners and operators must use an UST system made of or lined with materials that are compatible with the substance stored in the UST system."

Compatibility testing and documentation can assure owners and operators that a liner is compatible with the material to be stored. There are many test methods available (including EPA's SW-846 Method 9090A) and the data you provided cover many years of testing. EPA does *not*, however, determine whether or not a particular liner is compatible with any substance or blend which could be stored in UST systems.

However, if the liner is compatible with the substance stored and monitored at least every 30 days as required in section 280.41, a system incorporating a flexible membrane could be shown conclusively to meet the release detection requirements for petroleum USTs.

Release detection for hazardous substance USTs

A *hazardous substance* UST system, which is defined in section 280.12, must currently meet, at a minimum, the requirements for a petroleum UST plus additional requirements for hazardous substance UST systems found in section 280.42(b)(2). New systems must meet the additional requirements now; existing systems must meet the additional requirements by December 22, 1998. These additional requirements include secondary containment systems which must be designed, constructed, and installed to:

- contain regulated substances released from the tank system until they are detected and removed;
- prevent the release of regulated substances to the environment at any time during the operational life of the UST system; and
- be checked for evidence of a release at least every 30 days.

The regulations note that the provisions of 40 CFR 265.193 (a portion of the regulations promulgated pursuant to subtitle C of the Resource conservation and Recovery Act that is applicable to tanks storing *hazardous wastes*) may be used to comply with these requirements. We consulted with representatives of EPA's Office of Solid Waste (OSW), who could not state without more extensive review that flexible membrane internal containment systems would meet the requirements of section 265.193. They further recommended that, since most states are authorized to operate their hazardous waste programs; inquiries should be made to the individual states. OSW also recommended the Technical Resource Document for the Storage and Treatment of Hazardous Waste in Tank Systems (EPA/530/SW-86-044, National Technical Information Service PB86-2194l7/AS) as a helpful resource.

Although compliance with the hazardous waste tank regulations is unresolved, resolution of this question is not necessary to determine compliance with the UST regulations. We believe that a system which incorporates a flexible membrane as described above could meet the requirements of integral secondary containment for both petroleum and hazardous substances if the outer tank is in compliance with all other applicable requirements, including new tank standards now in effect and upgrading standards due to take effect in 1998.

Upgrading of existing UST systems and repairs allowed

Section 280.21 requires that, as of December 22, 1998, all tanks must meet new UST system performance standards, upgrading requirements, or closure requirements. The addition of a flexible liner system alone is not sufficient to meet either the requirements of this section for upgrading, or the requirements of section 280.33 for repairs. These sections require adherence to a code of practice developed by a nationally recognized association or independent testing laboratory, and we know of no such standards developed for the type of system described above.

Conclusion

A system with an internally fitted liner and an automated detection device matching the description above may be capable of meeting the Federal requirements for release detection for both petroleum and hazardous substance USTs if the liner is compatible with the substance stored and if an automated device triggers an alarm when any portion of either the outer tank or inner liner is breached. This same system cannot presently meet Federal requirements for upgrading or repairing existing UST systems.

Many leak detection methods are evaluated against standard test procedures to verify performance. Although such an evaluation is not required by EPA's regulations, it may help owners and operators and State and local governments judge how a system will meet particular needs.

The Office of Underground Storage Tanks encourages innovative approaches to UST problems. We also recognize the importance of nationally recognized associations and testing labs, and encourage developers to work with them in evaluating and documenting the performance of new systems. EPA labs are not currently involved in this area.

Thank you for contacting us and providing us with background information. If you have any questions, please contact David Wiley of my staff at (703) 308-8877.

Sincerely,

/s/

David W. Ziegele, Director
Office of Underground Storage Tanks

Attachment

cc: UST/LUST Regional Program Managers
Dawn Messier, OGC
Chester Oszman, OSW
Joe DLugosz, EMSL - Las Vegas
Anthony Tafuri, RREL, Edison
Barbara Simcoe, ASTSWMO
Josh Baylson, OUST
William Lienesch, OUST
David Wiley, OUST

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October2, 1992

Mr. David Ziegele, Director
Office of Underground Storage Tanks
US Environmental Protection Agency
401 M Street, SW
Washington, D.C. 20460

Dear Mr. Ziegele,

I would like to request clarification in writing on an issue that continues to confuse the UST leak detection industry, as well as many state regulators. In the federal UST regulations under 280.43(d)(2) there is the requirement of inventory control in addition to automatic tank gauging. This requirement is not consistent with that portion of the regulations (280.43) because the last section [(h)] says that "Other methods" may be used that can detect a release of 0.2 gph with a Pd of 0.95 and a Pfa of 0.05. Section (h) does not require other methods to be supplemented by inventory control. Automatic tank gauging clearly can meet the general leak detection requirements and, therefore, should not be mandated to have inventory control as a supplement.

I understand that this issue was clarified a couple of years ago in a letter from Jim McCormick to a Washington, D.C. law firm. We would greatly appreciate a letter that reiterated that clarification. Thank you very much.

Sincerely,

/s/

Philip B. Durgin
Senior Research Scientist

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

NOVEMBER 22, 1993

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

Mr. H. Lawrence Culp, Jr.
Veeder-Root
125 Powder Forest Drive
Post office Box 2003
Simsbury, CT 06070-2003

Dear Mr. Culp:

This letter responds to your request (copy enclosed) for clarification of the Federal underground storage tank (UST) regulations at 40 CFR 280.43 concerning automatic tank gauges (ATGs) and inventory control. A letter (copy enclosed) from this office dated April 18, 1989, to R. Sarah Compton, stated that inventory reconciliation need not be used to supplement the use of an automatic tank gauge capable of detecting a release of 0.2 gallons per hour with a 95% probability of detection and 5% probability of false alarm.

EPA has not changed this interpretation. If an ATG has been shown to meet the monthly performance standard, including the above probabilities, then, pursuant to 40 CFR 280.43(h)[1] inventory control is not required, regardless of the installation date. On the other hand, an ATG that has not been shown to meet the probability requirements must be used in combination with inventory control for compliance purposes. Note that 40 CFR 280.40(a) (3) requires that all ATGs permanently installed on or after December 22, 1990, meet the probability requirements.

At the time of promulgation of the UST rules in 1988, combining inventory control with the ATGS then in existence was required because ATGS had not been shown to meet the performance standard and probabilities. The Agency is now aware of more than 25 models which have been third-party certified as meeting them.

With regard to performance, a monthly test performed by an ATG which has been shown to meet the performance standard and probabilities is at least equivalent to monthly inventory control for a tank, and is usually much more rigorous.

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[1]40 CFR 280.43(h) states that "[a]ny other type of release detection method, or combination of methods, can be used if: (1) [i]t can detect a 0.2 gallon per hour leak rate or a release of 150 gallons within a month with a probability of detection of 0.95 and a probability of false alarm of 0.05; or ..."

Finally, the above interpretation is consistent with the Agency's intent at the time of promulgation of the UST rules. For example, the preamble to the final rule states , at 53 Fed. Reg. 37150-37151, "Currently, conducting monthly tank tightness testing is not a practical or economical method. Tank testing methods may be developed in the future, however, that can be performed on a monthly basis to detect leaks of 0.2 gallon per hour. The final rule allows the use of this method without inventory control once the method is proven to meet the performance standard...." The interpretation also is consistent with the Agency's intent to encourage gradual movement toward general performance standards, as opposed to method-specific requirements. (See, for example, 53 Fed. Reg. 37144 and 37166.)

As you know, state UST programs may impose more stringent requirements than the federal regulations. The owner and operator should check with the state to determine whether the state regulations are different than the federal rule.

The Agency believes that inventory control is a very useful tool in the comprehensive management of a UST system and encourages its use in conjunction with other methods as a matter of prudence. EPA also encourages owners and operators to perform ATG leak tests more frequently than the monthly minimum, in order to detect leaks earlier and from any portion of the tank that routinely contains product. Each ATG should be properly programmed and calibrated for its particular tank.

If you have any further questions, please contact Randy Nelson at (913) 551-7220 or David Wiley at (703) 308-8877.

Sincerely,

/s/

David W. Ziegele, Director
Office of Underground Storage Tanks

Enclosures (2)

cc: UST/LUST Regional Program Managers
UST/LUST Regional Branch Chiefs, (w/o enclosures)
UST/LUST Regional Counsels
OUST Management Team, (w/o enclosures)
Shonee Clark, OUST, (Compendium)
Dawn Messier, OGC
Randy Nelson, Region 7
Milton Robinson, OECA
Barbara Simcoe, ASTSWMO
David Wiley, OUST

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR 18, 1989

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

R. Sarah Compton, P.C.
McDermott, Will & Emery
1850 K Street, N.W.
Washington, D.C. 20006-2296

Dear Ms. Compton:

This is in reply to your letter of March 21 concerning tank monitoring systems and inventory control. Under EPA's regulations any automatic in-tank monitor capable of detecting a release of 0.2 gallons per hour with a 95% probability of detection and a 5% probability of false alarm need not be supplemented with inventory reconciliation.

I hope this information is helpful.

Sincerely,

/s/

Jim McCormick, Director
Policy & Standards Division
Office of Underground Storage Tanks

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

NOV 18, 1993

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

MEMORANDUM

SUBJECT: Inconclusives with Statistical Inventory Reconciliation

FROM: David Ziegele, Director /s/
Office of Underground Storage Tanks

TO: UST/LUST Regional Program Managers
UST/LUST Regional Attorneys

Staff in several regions have asked us to provide guidance in response to the following question:

> During an inspection, is the facility out of compliance if the release detection method in use is statistical inventory reconciliation (SIR), and a monthly report shows "inconclusive"?

The Federal regulations require that all release detection methods (with the exception of the combination of tightness testing and inventory control) be conducted at least every 30 days for USTs and associated piping. An inspector should review the release detection test results for the Method being applied at that facility. With SIR, the inspector will review monthly test results for 12 consecutive months, and one test must fall within each month of the previous 12 months. If a test result is missing, inconclusive, or if a test was not conducted, the owner and operator are in violation of 40 CFR § 280.41.

If annual tank tightness testing is used in conjunction with inventory control, for example, a valid annual test result must be available, as well as the previous twelve months of reconciled inventory records. Likewise, conclusive test results for the previous twelve months must be available when SIR is used as the monthly method. If an owner or operator has one or more inconclusive SIR test results for the previous 12 month period, he or she is in violation of the release detection requirements and is not conducting adequate release detection.

Valid and conclusive test results are required and must be available for review for the facility to be in compliance. An owner or operator cannot wait until the next month (or year) before testing again. The owner or operator must provide adequate inventory records and his or her equipment must be functioning properly to obtain valid test results. If not, the facility is not conducting release detection in accordance with the Federal regulations and therefore is not in compliance.

Sometimes when SIR is first applied to a facility, inconclusives are reported for the first month or two -- until problems such as imprecise inventory practices are corrected. To avoid being out of

compliance, we recommend that these facilities continue to practice another leak detection method as a backup until such time as they have received conclusive test results from the SIR vendor for two consecutive months.

Of course, inspectors should use their enforcement discretion as appropriate. An example might be the case of only one inconclusive result. SIR vendors have procedures for investigating the cause of inconclusive results, and an inspector may take into consideration the extent to which they were followed and the problem addressed.

Because of the growing use of SIR, I plan to send copies of this memorandum directly to State UST managers in the near future. If you have any questions or need additional information, please contact Randy Nelson (913-551-7220) or David Wiley (703-308-8877).

cc: UST/LUST Regional Branch chiefs
Dawn Messier, OGC
Milton Robinson, OECA
OUST Management Team

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

FEB 7, 1994

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

Seth C. Hunt, President
USTMAN Industries, Inc.
12265 W. Bayaud Ave., Suite 110
Lakewood, Colorado 80228

Dear Mr. Hunt:

Thank you for your letters of December 17, and December 30, 1993 (enclosed) expressing concerns with my November 18, 1993 memorandum (also enclosed) regarding inconclusive results and the statistical inventory reconciliation (SIR) method of release detection. You voice several concerns, but there are two that seem most important. The first is your concern about the possibility of inspectors pursuing enforcement actions against underground storage tank (UST) facilities with as few as one result that is not conclusive during the period prior to the issuance of my memorandum. The second main concern regards the use of the term "inconclusive."

We have reviewed this issue, and our interpretation remains that stated in the November 18, memorandum, that is, that EPA's UST release detection regulations require an owner or operator to use a method that conclusively meets the performance standards to be in compliance. By conclusively we mean making a determination against a standard, such as a leak rate, with the required probabilities of detection and of false alarm. 40 CFR 280.41(a) requires generally that "tanks must be monitored at least every 30 days for releases using one of the methods listed in 280.43(d) through (h)...." SIR, when used as a 30-day method, falls under 280.43(h), which states that "any other type of release detection method, or combination of methods, can be used if: (1) <u>It can detect</u> a 0.2 gallon per hour leak rate or a release of 150 gallons within a month with a probability of detection of 0.95 and a probability of false alarm of 0.05..." (emphasis added). A result that is not conclusive indicates that the method, as performed in a particular instance, cannot meet the required performance standard. Therefore, if this test is the only one conducted during a 30-day period, the owner or operator is not in compliance with the regulations.

In addition 40 CFR 280.40(a)(2) requires that methods be "installed, calibrated, operated and maintained in accordance with the manufacturer's instructions, including routine maintenance..." It is the responsibility of owners and operators to collect data that is complete enough and of sufficient quality to perform leak detection properly. In cases of results which are not conclusive and which are due to none error on the part of the party using the method, it is likely that such results could indicate a violation of this provision as well.

In response to your first main concern, contrary to the assertion in your letter, this is not a new requirement, but a clarification of how the existing requirements apply to SIR. However, we understand that some people have not had this understanding. Therefore, in cases of a lack of a conclusive SIR result for a single month in the past, by copy of this letter, we encourage States and Regions to consider, among other factors, the efforts of owners and operators to comply in assessing the appropriate enforcement response, if any. This is in keeping with the enforcement discretion I noted in my previous memorandum.

In addition, my memorandum stated that inspectors at sites using SIR will review monthly test results for 12 consecutive months. Of course, this is not the case if the facility had begun using SIR more recently than 12 months ago. For whatever monthly leak detection method or combination of methods, owners and operators must, per 280.45(b), maintain records of monitoring for at least one year, or another reasonable period of time determined by the implementing agency.

Your second main concern is that the interpretation could be applied only to SIR results that use the term "inconclusive," and not to results that are reported in some other way. To restate, owners and operators relying on SIR to meet monthly leak detection requirements must obtain a conclusive result of a test which can meet the performance standard of 40 CFR 280.43(h) (1) A lack of this conclusive result may be indicated in various ways; the use of the term "inconclusive" is only one of the ways.

Another concern you express is about the initial evaluation of vendor's SIR methods, which typically are third-party certifications following guidance in EPA's Standard Test Procedures for Evaluating Leak Detection Methods. It is true that in this evaluation results that are not conclusive are acknowledged in the procedures, but these evaluations are intended to demonstrate that the method is generally capable of meeting the performance standard, not that it can in any particular instance.

You also express the opinion that, in lieu of the reasoning above, EPA should interpret the release reporting requirements of 40 CFR 280.50(c) as requiring that results that are not conclusive be treated as suspected releases. However, results that are not conclusive do not constitute "monitoring results" that "indicate a release may have occurred." The lack of a conclusive result simply indicates that it was not possible, using the data available, to determine if a release of 0.2 gallons per hour had occurred within the probabilities of detection and false alarm required by EPA's regulations. These requirements, though related to the release detection requirements noted above, do not address the actual performance of release detection, and therefore cannot be relied on for a determination of compliance with the release detection requirements.

I want to reiterate that we understand that conclusive results may not be possible in a small percentage of the tank data that are analyzed each month with SIR, as with other methods, and that there are several reasons for this. We know that an important difference between SIR and other methods is that, because SIR depends on data collected over a period of several days, a retest cannot be conducted as quickly as with other methods. Our goal is to promote compliance by encouraging effective leak detection practices. Our interpretation is in keeping with the regulations' emphasis on frequent monitoring as important in protecting the environment. I also would like to reiterate that

information on the performance of SIR in the field would be of great interest to regulators. I hope that this letter is helpful in addressing your concerns.

Sincerely,

/s/

David W. Ziegele, Director
Office of Underground Storage Tanks

Enclosures: 11/18/93 letter from David Ziegele
12/17/93 letter from Seth Hunt (without enclosure)
12/30/93 letter from Seth Hunt (without enclosure)

cc: UST/LUST Regional Program Managers
UST/LUST Regional Branch chiefs
UST/LUST Regional Attorneys
OUST Management Team
State UST Program Managers
Dawn Messier, OGC
Randy Nelson, Region 7
Milton Robinson, OE
David Wiley, OUST

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

FEB 13 1995

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

W. Dale Tanke
Storage Tank Safety Engineer
Division of Petroleum and Chemical Safety
Office of Illinois State Fire Marshal
1035 Stevenson Drive
Springfield, IL 62703-4259

Re: Siphon bars connecting underground storage tanks.

Dear Mr. Tanke:

This is in response to your letter of May 23, 1994 to Gerald Phillips of Region V (copy enclosed), as well as subsequent conversations with Bill Faggart of our office, relating to the use of siphon bars connecting multiple underground petroleum tanks. You expressed concern that siphon bars are a source of leaks in underground storage tank (UST) systems and should thus be required to have leak detection and corrosion protection.

The UST community should be aware that existing leak detection and corrosion protection regulations already address siphon bars as part of UST systems. Under 40 CFR §280.12, an UST system is comprised of an underground storage tank(s), connected underground piping, underground ancillary equipment, and containment system, if any. Owners and operators of new and existing UST systems must provide a method or combination of methods of release detection that can detect a release from any portion of the tank and the connected underground piping that routinely contains product (40 CFR §280.40(a)). Inasmuch as siphon bars routinely contain product, they are regulated as part of the underground piping.

That having been said, the siphon systems you describe operate and are regulated in the same manner as safe suction product dispensing systems. If a hole develops in the siphon bar, the product level in the bar drops to the height of the product in the tank. If the size of the hole is small enough that an air bleeder line can compensate and reestablish the siphon, air (or groundwater) would be pulled into the siphon bar during operation of the pump. When fuel dispensing halts, the vacuum would again be lost and product would return to the tanks. Therefore, for a

properly designed and installed siphon bar, no release detection is required (40 CFR §280.41(b)(2)). As for the issue of releases during filling, note that forced cascading of product due to intentional overfill during fill operations is an improper operating procedure. Transfer operations must be monitored to prevent overfills (40 CFR §280.30(a)).

The federal regulations are also relevant to the corrosion issue you raised. Piping installed since December 22, 1988 that routinely contains regulated substances and is in contact with the ground must be properly designed, constructed, and protected from corrosion (40 CFR §280.20(b)). Effective December 22, 1998, this requirement extends to all UST system piping, no matter when installed. Siphon bars on such systems must therefore be protected from corrosion.

With respect to your concern that inventory control should not be allowed as an acceptable means of leak detection for multiple tank systems connected with siphon bars, we agree that inventory control, alone, is unacceptable. Periodic tightness tests are also required. As you point out in your letter, it is during these tightness tests that problems with siphon bars are often discovered. Further, it should be noted that the federal UST regulations limit the period of time inventory control with tightness testing (ICTT) can be used at all. ICTT can be used on systems installed prior to December 22, 1988 only until December 22, 1998. Systems installed or upgraded to new tank standards after December 22, 1988 can continue to use ICTT for ten years subsequent to the installation or upgrade.

In view of the fact that siphon bars and manifolded tank systems are addressed under existing UST regulations, the Office of Underground Storage Tanks has no plans to impose additional requirements. Of course, state programs are at liberty to develop regulations that are more stringent than the federal regulations. Illinois' own decision to disallow the use of siphon bars is one such example.

Thank you for your input on this technical issue. I hope that this letter is helpful in allaying your concerns.

Sincerely,

Lisa Lund, Acting Director
Office of Underground Storage Tanks

Enclosure

cc: UST/LUST Regional Program Managers
Dave Webster, New England Region
Stan Siegel, Region II
Robert Greaves, Region III
Mary Kay Lynch, Region IV
Norman Niedergang, Region V
Guanita Reiter, Region VI
Lynn Harrington, Region VII
Robert Duprey, Region VIII
Laura Yoshii, Region IX
Ken Feigner, Region X
UST/LUST Regional Counsels
State UST Managers
OUST Management Team
Shonee Clark, OUST (Compendium)
Randy Nelson, Region VII
Dawn Messier, OGC

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

FEB 7, 1995

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

Robert Staab, Manager
Environmental Compliance
The Circle K Corporation
PO Box 52084
Phoenix, AZ 85072-2084

Re: Transition from Manual Inventory Reconciliation with Annual Tightness Test to Monthly Statistical Inventory Reconciliation

Dear Mr. Staab:

This is in response to your letter of October 4, 1994 (copy enclosed) in which you request clarification as to the regulatory requirements associated with the transition from one form of leak detection to another.

First, changing from one acceptable leak detection method to another can be done at any time. Contrary to the assumption in your letter, Environmental Protection Agency (EPA) regulations do not require that once a method is chosen, it must be used for a full, twelve-month "cycle." Consequently, once you successfully switch over to an acceptable monthly monitoring method, you do not need to continue manual reconciliation of inventory records. Similarly, pursuant to the Federal regulations (40 CFR §280.41(a)), migration to an acceptable monthly monitoring method negates the need to perform an annual tank tightness test. (Note, however, that, depending on the type of piping system employed and the type of release detection used, you may still be required to perform periodic line tightness tests.) Finally, regardless of method or change in method, you should ensure that all leak detection records are properly maintained in accordance with §280.45.

Of course, please keep in mind that states in which you do business may have additional requirements. Please consult with the underground storage tank programs in those states to learn of any state-specific conditions.

I hope this clarifies the issues you raised. Should you have further questions, please contact Bill Faggart at (703) 308-8897.

Sincerely,

/s/

Lisa Lund, Acting Director
Office of Underground Storage Tanks

Enclosure

cc: UST/LUST Regional Program Managers
Dave Webster, New England Region
Stan Siegel, Region II
Robert Greaves, Region III
Mary Kay Lynch, Region IV
Norman Niedergang, Region V
Guanita Reiter, Region VI
Lynn Harrington, Region VII
Robert Duprey, Region VIII
Laura Yoshii, Region IX
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

DEC 12, 1995

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

Mr. Robert Staab
Corporate Environmental Manager
Circle K Stores Inc.
P.O. Box 52084
Phoenix, Arizona 85072-2084

Dear Mr. Staab:

This is in response to your letter of September 18, 1995 (enclosed), in which you request clarification of certain reporting requirements under the federal underground storage tank (UST) regulations. Specifically, at issue is the interpretation of EPA's requirement for reporting that a release may have occurred based on inventory control results. 40 CFR §280.50 generally requires reporting of monitoring results from a release detection method that indicate that a release may have occurred unless: "in the case of inventory control, a second month of data does not confirm the initial result. " 40 CFR §280.50(c) (2) (emphasis added).

EPA interprets the language "confirm the initial result" to mean that the difference between the physical and calculated inventories is greater in magnitude than the regulatory standard of 1% of throughput plus 130 gallons for a second month in a row, no matter whether the direction -- short or over -- is the same as the first month .

Thus the variance combinations of short-short, over-ov~er, short-over, and over-short must all be reported to the implementing agency within 24 hours, or another~time period specified by the implementing agency. Of course, a report is not required if immediate accounting corrections are made. Such corrections should be limited to recalculating and the reading of tank charts, and should not include revising raw data like stick readings, totalizer readings, or delivery volumes.

Since reporting suspected releases leads to release investigation, we recognize that a tightness test or a site check may be overkill in some cases. However, §280.52 provides flexibility by allowing investigation by "another procedure

approved by the implementing agency." By copy of this letter, EPA recommends that each implementing agency allow procedures as it deems appropriate in this case.

We believe that EPA's position is well-founded, reasonable, and furthers the goal of protecting human health and the environment without unduly burdening the regulated community. Revision of our guidance documents, which are consistent with this clarification, is therefore not necessary at this time. Please see the enclosed discussion paper, which provides background information and more detailed analysis.

Thank you for bringing your concerns to us. I apologize that EPA staff provided Mr. Esperson with a response counter to the above in an earlier telephone conversation. If you have any questions or comments on this issue, please contact David Wiley, at (703)308-8877.

Sincerely,

/s/

Lisa C. Lund, Acting Director
Office of Underground Storage Tanks

Enclosures:
Sept. 18, 1995 Robert Staab letter
Discussion paper

cc: Stephen Crimaudo, ASTSWMO
Larry Brill, Region 1
Stanley Siegel, Region 2
Maria Vickers, Region 3
Mary Kay Lynch, Region 4
Willie Harris, Region 5
Willie Kelley, Region 6
Bill Pedicino, Region 7
Stephen Tuber, Region 8
Laura Yoshii, Region 9
Lauris Davies, Region 10
Katherine Nam, OGC
Joan Olmstead, OECA
Shonee Clark :(Compendium)
OUST Management Team

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Discussion: Reporting Inventory Control Results

Background

The inventory control method of UST system leak detection involves comparing physical, "stick" liquid product inventories and calculated, "book" inventories. In common usage, a "short" results when physical inventory minus book inventory yields a negative number. Conversely, an "over" occurs when this number is positive.

EPA regulations [1] established a monthly standard maximum discrepancy between stick and book inventories of 1.0 percent of flow-through plus 130 gallons. In addition, the UST regulations [2] state that a report must be made to the implementing agency if "monitoring results from a release detection method .... indicate a release may have occurred unless .... [i]n the case of inventory control, a second month of data does not confirm the initial result" (emphasis added).

Circle K asserts that the language "confirm the initial result" means that there are either two consecutive "shorts" greater in magnitude than the. standard or two consecutive "overs" greater in magnitude than the standard. Circle K notes, however, that EPA's booklet Doing ***Inventory Control Right*** [3] ***(DICR)*** and multiple regulatory agencies interpret this language to mean that two consecutive variances are greater in magnitude than the standard, no matter whether the variances are short or over.

Although reporting suspected releases leads to release investigation under the regulations, the regulations allow investigation by "another procedure approved by the implementing agency" [4] in addition to the listed procedures of system tests or site checks.

Clarification

EPA interprets the language "confirm the initial result" to mean that the variance is greater in magnitude than the regulatory standard for a second month in a row, no matter whether the direction -- short or over -- is the same as the first month. In addition, EPA recommends that each implementing agency allow alternative procedures as it deems appropriate to satisfy the release investigation requirements.

Rationale

There are multiple reasons that EPA requires that a report be made regardless of whether variances are over or short.

The requirement is practical. An over or short monthly result indicates a leak or other material loss, a gain in stored material, or errors in the method such that the status of the UST system relative to the standard cannot be determined. The cases of concern to Circle K, that of an over-short combination and a short-over combination, indicate that inventory control, as performed, can be masking actual leaks and therefore cannot detect a leak at the standard flow rate, as required. This is true even if a mere accounting error is the reason for the variances. On occasion, these combinations also may be caused by an incorrect tank chart or a tank with a hole which is affected by fluctuating ground water levels. Aside from leak detection, such variances are bad for business, since the operator cannot detect short deliveries or thefts if data collection and reconciliation are not done properly. Thus, both overs and shorts are of concern, and any combination pair should be reported.

The clarification above is consistent with the regulatory record. Nothing in the UST technical regulations, in the preamble to the final rule [5], or in the public comments and responses to the proposed rule [6] is contrary to this clarification.

Furthermore, this clarification is consistent with previous guidance. Multiple other EPA documents [7,8] in addition to ***DICR*** explicitly agree with the clarification. Moreover, this interpretation is not strictly a view of regulatory agencies only. ***DICR*** was developed in cooperation with seven leading industry associations, and the American Petroleum Institute's (API's) recommended practice [9] interprets the issue in the same way as EPA.

In addition, the leak detection requirements are flexible and are not onerous. In setting the final UST technical standards, EPA chose an inventory control standard that was less stringent than it initially proposed, and less stringent than the one still found in API's recommended practice. EPA chose a less stringent requirement because it found that these other standards, as implemented in the real world, yielded a rate of false alarms that was unacceptably high. Thus, EPA finalized inventory control requirements which allow operators to, with some care, detect large leaks and other inventory problems without a large number of false alarms, essentially free of charge.. Those who, for whatever reason cannot perform inventory control sufficiently can choose from dozens of other leak detection systems available.

Likewise, the reporting and investigation requirements are not unduly burdensome. In the final rule, EPA relaxed the proposed reporting requirements for inventory control, by allowing the second month of data to be considered before reporting. Reporting in itself is not costly or time-consuming. State and EPA commenters did not feel that the reports are burdensome, either for agencies

or for operators. The subsequent investigation need not be burdensome, either. The correction of calculations may be all that is required.

State agency officials who EPA contacted agree with the above interpretation, and generally support maintenance of the requirement. They cite a need to know all repeated variances, and some note that inventory control results which are not reported are a recurrent and serious problem, because real releases are not detected until their impacts are much worse than if variance results had been heeded.

Conclusion

In sum, the Agency believes the above clarification is not unduly burdensome and is consistent with good and practical UST management, with the regulatory record, with public and private sector guidance documents, and with protection of human health and the environment.

Notes

1. 40 CFR §280.43(a)

2. 40 CFR §280.50(c)

3. EPA, ***Doing Inventory Control Right: For Underground storage Tanks,*** Nov 1993, pp 12, Monthly Inventory Record.

4. 40 CFR §280.52

5. 53 ***Federal Register*** 37082-37194.

6. EPA, OUST, "Comment Summaries and Responses Documents for the Final Technical Standards and the State Program Approval Regulations," 1988, p 17-8.

7. EPA, ***Detecting Leaks: Successful Methods Step-by-Step;*** Nov. 1989, pp 29-30.

8. EPA, OUST, ***Common Questions on Leak Detection,*** Feb. 1990, p 15.

9. American Petroleum Institute Recommended Practice 1621, ***Bulk Liquid Stock Control At Retail Outlets,*** May 1993, p 1.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460
Mail Code 5401G

JUL 25 1997

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

MEMORANDUM

SUBJECT: Applicability Of A Combination Leak Detection Method For Upgraded Underground Storage Tanks

FROM: Anna Hopkins Virbick, Director
Office of Underground Storage Tanks

TO: EPA UST/LUST Regional Program Managers
State UST Program Managers

This memorandum clarifies an underground storage tank (UST) leak detection issue that affects a subset of existing USTs. This subset consists of existing USTs in which the tank itself meets 1998 standards for corrosion protection before or after the entire UST system meets 1998 standards for spill, overfill, and corrosion protection. A question has arisen as to the length of time this subset of existing USTs may use the leak detection method that combines monthly inventory control with tank tightness testing every five years for regulatory compliance. For convenience, in the clarification which follows, we will call this leak detection method the "combination method."

When can you start using the combination method as an approved leak detection method?

The federal regulations at § 280.41(a)(1) state that the combination method satisfies federal leak detection requirements only when applied to an UST system that meets the performance standards for new UST systems (at § 280.20) or upgraded UST systems (at § 280.21). Basically, these standards require the UST system to have spill, overfill, and corrosion protection for tanks and piping.

How long can an UST system use the combination method?

Federal regulations at § 280.41(a)(1) state that the combination method may be used for a maximum of 10 years after the tank is installed or upgraded with corrosion protection. *Note that this time period is based on the compliance status of the* ***tank only****, not the entire UST system.*

This information is basically consistent with EPA materials circulated to date and should create no confusion as long as: 1) the tank and the rest of the UST system are upgraded at the same time, or 2) the tank has corrosion protection added after the rest of the system has been upgraded. In these cases, USTs can use the combined method for 10 years after the tank has corrosion protection or December 1998, whichever date is later.

But what about the smaller subset of existing USTs in which the tank has corrosion protection ***before*** the rest of the UST system meets upgrade standards? In some of these cases, the combined method may not be valid for more than a few years. As noted above, the federal regulations at § 280.41(a)(1) state that once the entire system is upgraded the combination method can meet the federal leak detection requirements. However, § 280.41(a)(1) also establishes an ending date for the period during which this combination is valid. **The ending date is either 10 years after the date the tank has corrosion protection or December 22, 1998, whichever date is later.** Since the period of validity cannot begin until the whole system has met upgrade or new performance standards, the period of validity is less than 10 years in cases only where the tank has been protected from corrosion before the rest of the UST system meets the upgrade standards.

The sample cases which follow illustrate three typical situations:

Tank and other UST system components all upgraded at the same time: For example, a bare steel tank installed in 1980 is subsequently, in 1995, assessed by means of an internal inspection and is upgraded with corrosion protection, has spill and overfill protection added, and is equipped with new piping. This UST system can use the combination method from 1995 until 2005, which is the later of the two potential ending dates (either 1998 or 10 years following the date the tank has corrosion protection). After 2005, the UST in this example must use a monthly monitoring method.

Tank has corrosion protection added after the rest of the UST system meets upgrade standards: For example, a bare steel UST installed in 1980 has its piping upgraded and spill and overfill protection added in 1993, but the tank is not upgraded with corrosion protection until 1995. This UST system can use the combination method from 1995 until 2005, which is the later of the two potential ending dates (either 1998 or 10 years following the date the tank has corrosion protection). After 2005, the UST in this example must use a monthly monitoring method.

Tank has corrosion protection *before* the rest of the UST system meets upgrade standards: For example, a bare steel tank is upgraded with corrosion protection in 1986 (or the tank is made of noncorrodible material and installed in 1986), but the piping, spill, and overfill upgrades were not added until 1995. This would mean that the UST system could start using the combination method to meet federal leak detection requirements only in 1995 (when the full system first met all upgrade standards) and could use the combined method only until 1998 (the date which is the later of either 1998 or 10 years after the tank has corrosion protection). In this example, the UST

may use the combined method to meet federal leak detection requirements only for three years (from 1995 to 1998). After 1998, the UST in this example must use a monthly monitoring method.

You should be aware that these qualifications apply also to USTs ranging in capacity from 1,001 to 2,000 gallons that use a variant of this combination method. These small USTs are allowed to use a combined method of manual tank gauging with tank tightness testing every five years with the same qualifications noted above for USTs using the method that combines inventory control and tank tightness testing. (Please note that the requirements for "manual tank gauging" differ greatly from the requirements for "inventory control"; do not confuse these two separate leak detection methods.)

In all cases, when the combination method can no longer be used, monthly monitoring is required by the federal leak detection regulations. Approved monthly monitoring methods are identified in § 280.43 (b), (d)-(h) as manual tank gauging (only for tanks 1,000 gallons or smaller), automatic tank gauging, vapor monitoring, groundwater monitoring, interstitial monitoring, and other methods, such as statistical inventory reconciliation, that meet performance standards or are approved by the implementing agency as equally effective in detecting leaks.

If USTs are not using monthly monitoring or are not eligible to use the combination method (as in the examples above when the entire UST system has yet to meet upgrade standards), the only allowable leak detection method is ***annual*** tightness testing combined with inventory control. However, USTs lacking full system upgrade can use this method only until December 1998, after which they must be replaced by new USTs, upgraded to meet 1998 standards, or be properly closed.

Some questions have arisen as to when the tightness tests required "every five years" must take place. There is potential confusion if the UST can use the combination method as a valid method for a number of years that is not a multiple of five years, for example, for three or eight years. While a tightness test is probably beneficial, EPA's regulations do not require testing at the end of the period of validity. Thus the requirement for testing at least every five years for a tank that may only use the combination method for three years does not require a test at the third year. However, over an eight-year period it does require at least one test in either the third, fourth, or fifth year, so that no more than five years elapse between the tightness test and both the beginning and the end of the leak detection method's period of validity.

Hazardous substance tanks are generally not impacted by this clarification, because after December 22, 1998 they must begin monthly interstitial monitoring unless a variance is granted by the implementing agency.

For many older tanks, December 22, 1998 is the deadline for changing to stand-alone monthly monitoring methods, and is thus an important release detection deadline as well as a corrosion, spill, and overfill protection deadline.

Finally, please note that some implementing agencies have more stringent or different requirements. For example, some implementing agencies have adopted more stringent leak detection requirements for certain tanks upgraded under § 280.21(b)(2)(iv) regarding alternative integrity assessment methods used before upgrading steel tanks with cathodic protection. In these cases, if the implementing agency requires stand-alone monthly monitoring, today's clarification regarding the applicability of the combination method of leak detection does not apply (see memorandum dated July 25, 1997, "Guidance On Alternative Integrity Assessment Methods For Steel USTs Prior To Upgrading With Cathodic Protection").

This memorandum provides final clarification to the issue addressed in our draft circulated April 15, 1997, titled "Transmittal of Draft Interpretation of Leak Detection Requirements where a Tank Meets 1998 Standards at a Different Time than Other UST System Components." If you have any questions about this memorandum of clarification, please contact OUST's David Wiley (phone 703 603-7178 or e-mail **wiley.david@epamail.epa.gov**).

cc: EPA UST/LUST Regional Program Managers' Supervisors
Kathy Nam, OGC
Joan Olmstead, OECA
Larry Magni, American Petroleum Institute
Sullivan Curran, Fiberglass Tank and Pipe Institute
Marc Katz, National Association of Convenience Stores
Bob Renkes, Petroleum Equipment Institute
John Huber, Petroleum Marketers Association of America
Mark Morgan, Petroleum Transportation & Storage Association
Roy Littlefield, Service Station Dealers of America
Wayne Geyer, Steel Tank Institute
Tom Osborne, Society of Independent Gasoline Marketers of America
Kimberly Michienzi, Booz Allen Hamilton (Hotline)
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