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State of Louisiana

DEPARTMENT OF ENVIRONMENTAL QUALITY
ENVIRONMENTAL ASSESSMENT

MEMORANDUM

To: Underground Storage Tank Owners and Interested Parties

From : Lou Buatt, Assistant Secretary
Office of Environmental Assessment

Date: May 29, 2008

RE: Alternative Assessment Method for Internally Lined Tanks

The Louisiana Department of Environmental Quality (LDEQ) has been requested to consider an alternative assessment method for Underground Storage Tanks that were previously lined, to determine if the integrity of the tank is adequate for the installation of a corrosion protection system.

LDEQ has evaluated available information and has determined that it is in the best interest of the citizens of Louisiana to allow an alternative tank integrity assessment in Louisiana. This alternative assessment method will be to allow installation of impressed current systems on steel tanks where internal liners were previously installed to meet tank upgrade requirements, provided that the tanks pass an initial tank tightness test and certain other conditions are met. These alternative assessment requirements are that tank tightness tests are conducted, prior to and between three and six months after installation of the impressed current systems and annually thereafter. In addition, this method will require that the facility does not use inventory control or manual tank gauging as a release detection method. This alternative assessment will be as effective as current alternative assessment methods allowed by EPA to evaluate tank integrity and will have additional safeguards in place regarding release detection and annual tank tightness testing. This decision has been made in consideration of the impact closure of these facilities would have on our fuel supply in rural areas, the impact on small business owners in the State of Louisiana, impact to the Motor Fuels Underground Storage Tank Trust Fund, the effectiveness of the alternative assessment method in comparison to what is currently allowed by EPA and neighboring states and protection of human health and the environment. Underground Storage Tank owners will have to make business decisions to determine if use of this alternative method is in their best interest based on the cost of the installation of Corrosion Protection, expected facility life and throughput, future use of alternative fuels that may not be compatible with tank liners, costs of closure and costs of new tank installation. In addition, LDEQ intends to closely monitor these systems, and if a significant increased incidence of releases from these systems is documented, plans to initiate rulemaking to require removal of these tanks within a specified time frame.

Attached is the basis of decision for allowing this alternative testing method. Please contact Mr. Sam Broussard of my staff at 337-262-5744 if you have any questions.

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Evaluation of Alternative Integrity Assessment for Upgrading Existing Internally Lined Underground Storage Tanks with Corrosion Protection

The Louisiana Department of Environmental Quality (LDEQ) has been requested by several tank owners, corrosion experts and tank testers to consider allowing an additional alternative integrity assessment for internally lined steel tanks, in accordance with LAC 33:XI.303.C.3.b.iv, similar to what is allowed in the states of Mississippi, Texas and Tennessee. In these states it has been decided that performance of tank tightness tests before and after the installation of Corrosion Protection systems is as effective as the alternative integrity assessment options allowed by the Environmental Protection Agency (EPA) to determine tank integrity prior to installation of a Corrosion Protection system. LDEQ has evaluated what is allowed in various states across the country and has had several discussions with EPA regarding alternative assessments. Following is the regulatory background on this issue:

History:

LAC 303.C.3 - All steel tanks were required to either be upgraded (in accordance with LAC 33:XI.303.A) with corrosion protection or permanently closed by 12/22/98.

The following three methods of upgrade options were allowed:

1) Addition of an internal liner.
2) Addition of a cathodic protection system.
3) Combination of an internal liner and a cathodic protection system.

LDEQ's TEMPO database identified 1071 underground storage tanks that have internal liners and may not have external corrosion protection (impressed current systems) in Louisiana. These 1071 tanks are located at 394 facilities.

Regulations:

LAC 33:XI.303.C.3.a
Internal Liner
The internal liner requirements are as follows:

Within 10 years after lining, and every 5 years thereafter, the lined tank is internally inspected and found to be structurally sound with the lining still performing in accordance with the original design specifications (LAC 33:XI.303.C.3.a.ii)

LAC 33:XI.303.A lists all the codes of practices developed by nationally recognized organizations that are to be used to comply with the UST regulations. LAC XI.303.A requires the internal lining inspection to meet one of these recommended practices:

NLPA **631** - Requires a visual inspection of the lining and a determination of the metal thickness through the lining by ultrasonic testing. This method required physical entry into the tank.

API 1631 – Requires physical entry into the tank for both a visual inspection of the lining and a tank metal thickness determination. A video inspection following the KWA method is allowed under API 1631.

KWA method – Requires a permanently recorded internal video inspection of the tank lining and a non-invasive external assessment for predicted structural integrity of the tank. The non-invasive test is a prediction model as described in ASTM G158-98, Section 11.3.5.1. Site specific parameters that are needed for the prediction model include stray currents, soil resistivity, structure-to-soil potential, soil pH, electrical continuity, REDOX potential, soluble chloride ion concentration, sulfide and sulfate ion concentrations, and any other tests deemed necessary by the corrosion specialist that is doing the predictions.

LAC 33:XI.303.C.3.b
Cathodic Protection

A tank may be upgraded with cathodic protection (anodes or an impressed current system) if the CP system meets these requirements:

1) CP system is designed by a corrosion expert;
2) Current operating status can be determined by rectifier inspections (every 60 days);
3) CP system is operated continuously and tested every 3 years by a qualified CP tester.

In addition, to the requirements listed above, the tank integrity must be ensured using one of the following methods:

1) Tank is internally inspected and assessed to ensure that the tank is structurally sound and free of corrosion holes (NLPA 631) before the CP system is installed (LAC 33:XI.303.C.3.b.i).
2) Tank is less than 10 years old and has met the release detection monitoring requirements (LAC 33:XI.303.C.3.b.ii).
3) Tank is less than 10 years old and is assessed for corrosion holes by conducting 2 tightness tests. One tightness test before the addition of the CP system, and one tightness test between 3 and 6 months after the first operation of the CP system (LAC 33:XI.303.C.3.b.iii).
4) Tank is assessed for corrosion holes by a method determined by the Department to prevent releases in a manner that is no less protective of human health and the environment than the methods listed above (LAC 33:XI.303.C.3.b.iv).

LAC 33:XI.303.C.3.c
Internal Lining Combined with Cathodic Protection

No lining inspections are required if either the CP is added at the same time as the lining is installed, or a tank integrity assessment is conducted prior to addition of the CP system, and as long as the CP system meets these CP system requirements:

1) CP system is designed by a corrosion expert;
2) Current operating status can be determined by rectifier inspections (every 60 days);
3) CP system is operated continuously and tested every 3 years by a qualified tester.

Tank Integrity Assessment Methods:

Based on a 12/4/95 EPA guidance memo, LDEQ has allowed UST owners to install a cathodic protection system on previously lined tanks. The 12/4/95 EPA memo specifies that if the tank is over 10 years old and the tank integrity is not assessed prior to the addition of the CP system, then the internal lining inspections must still be performed. A corrosion expert must assess the tank integrity.

EPA issued a 7/25/97 memo again stating that "tanks that are not structurally sound must not have their operational lives extended". This memo recommends implementing agencies determine that an alternative integrity assessment method that meets the following two options be considered to "prevent releases in a manner no less protective to human health and the environment" than the three methods listed in the regulations.

Option A: Ensure tank integrity by using a method in accordance with a standard code of practice developed by a nationally recognized association or independent testing laboratory

1) NLPA 631 - Requires a visual inspection of the lining and a determination of the metal thickness through the lining by ultrasonic testing. This method required physical entry into the tank.
   Results:
   - Average tank metal thickness shall be at least 75% of original tank metal thickness to pass.
   - Tanks not meeting wall thickness of 75% fail and shall be closed.
   - If average tank metal thickness is between 75% and 85%, a CP system (impressed current) shall be installed within 1 year of inspection date. At that time, no more lining inspections are needed.
   - If average tank metal thickness is >85%, addition of external CP is not required.
2) API 1631 - Requires physical entry into the tank for both a visual inspection of the lining and a tank metal thickness determination. A video inspection following the KWA method is allowed under API 1631.
3) KWA Method - Requires a permanently recorded internal video inspection of the tank lining and a non-invasive external assessment for predicted structural integrity of the tank. The non-invasive test is a prediction model as described in ASTM G158-98, Section 11.3.5.1. Site specific parameters that are needed for the prediction model include stray currents, soil resistivity, structure-to-soil potential, soil pH, electrical continuity, REDOX potential, soluble chloride ion concentration, sulfide and sulfate ion concentrations, and any other tests deemed necessary by the corrosion specialist that is doing the predictions.
   Results:
   - If the tank fails the prediction model, it cannot be re-lined unless tank integrity and wall thickness are determined adequate by a manned entry procedure.
   - CP can only be applied if both the lining inspection and structural integrity modeling passes.

- If the lining inspection fails, it has to be repaired or replaced before an impressed current system is added.

4) ASTM G 158 – Requires either non-invasive statistical modeling (based on soil sampling), invasive ultrasonic thickness testing with external corrosion evaluation (physical internal inspection and soil sampling), or invasive permanently recorded visual inspection and evaluation including external corrosion assessment (video camera or physical inspection and soil sampling).

Option B: Ensure tank integrity by using a vendor supplied procedure that has been successfully evaluated and certified by a qualified independent third party to meet specified performance criteria regarding detection of perforations and detection of either internal or external damage (A list of integrity assessments is outlined in 2/09/99 EPA).

1) Mean Time to Corrosion Failure (MTCF) – Requires soil sampling and statistical prediction modeling;
2) Tank Environmental Profiling (TEP) - Requires soil sampling and statistical prediction modeling;
3) Petroscope – Requires video camera inspection with soil sampling and statistical prediction modeling;
4) Tank Suitability Study (TSS) - Requires soil sampling and statistical prediction modeling.

Prior to the 1998 upgrade deadline, LDEQ allowed tank owners to perform either an invasive tank assessment method (Option A) or one of the non-invasive alternative tank integrity assessment methods listed in Option B above, in accordance with LAC 33:XI.303.C.3.b.iv.

LDEQ has been gathering information to evaluate if the request for an alternative assessment method should be granted. Following is a brief summary of the information collected:

Most internal tank liners were installed between 1998 and 1999 as part of the 1998 upgrade requirements. Now that the 10 year time-frame for the internal lining inspections is approaching, UST owners are beginning to have either the internal lining inspections performed or are installing impressed current systems. Prior to the installation of an impressed current system, a tank integrity assessment must be conducted. 94 UST facilities that are approaching the 10-year tank lining inspection date were recently polled. 41 of the 74 facilities either had the liners inspected or installed impressed current systems after performing one of the alternative tank integrity assessments. Of these 41 facilities, 11 have failed either the lining inspection or an alternative integrity assessment, and are currently deliberating upgrade options. 44 of the 94 facilities have added impressed current systems either without performing an alternative integrity assessment, or performing the assessments incorrectly. 9 of the 94 facilities have not yet decided on what option to perform.

Following is a summary of the issues and costs associated with the different tank upgrade options:

Current Options allowed by LDEQ:

Either perform the 10-year internal lining inspection for all lined tanks according to LAC 33:XI.303.C.3.a.ii, or install an impressed current system without performing the lining inspection, provided that the tank passes one of the Option A or B tank integrity assessments listed above, in accordance with LAC 33:XI.303.C.b.i and iv. Following are considerations regarding these options:

- Internal liners do not offer corrosion protection to tank exteriors.
- There are very few tank lining testers available. Scheduling the inspections to meet the 10-year deadline can not happen for most UST owners.
- Since most tank owners are waiting until the last minute to have tank linings tested, most will not be able to have the linings tested within the 10-year time frame.
- If the lining is tested in accordance with a video camera method, the tank integrity test portion of this method is not absolute, but a predictive model only.
- Adding an impressed current system at this time would not guarantee that the impressed current system is protecting a tank that has structural integrity.

  Physical entry into a UST carries inherent safety concerns due to confined space and benzene contaminant issues.
- According to NLPA 631, if the ultrasonic testing shows the tank thickness between 75-85%, an impressed current system must be added anyway.
- The cost of the lining inspection alone are very expensive (approximate prices range from $1500 per tank to $9000 per facility with mobilization charges), and the UST might still have to be re-lined or removed if the inspection fails.
- Many small UST owners would have to permanently close tanks as opposed to having to pay for lining inspections.
- The alternative tank integrity assessment methods are cheaper than tank lining inspections (generally $2000-3000 per site).
- The tank lining inspections usually fail, so this saves money compared to failing a lining inspection and then adding an impressed current system.
- Adding an impressed current system provides corrosion protection to the tank exterior, as internal linings do not.
- Alternative integrity assessments are predictive tools only, and they do not provide absolute information of a tanks' integrity.
- Alternative integrity assessments assume generalized corrosion when predicting integrity, and most, if not all, corrosion experts agree that generalized corrosion is not the cause of leaks in USTs.
- One method, Mean-time to Corrosion Failure (MTCF) uses the tank age in the statistical predictions, and usually fails tanks that are older than 25 years of age regardless of the tank condition.
- Many corrosion experts and UST contractors have stated that they have witnessed removal of tanks that failed MTCF tests, where the tanks turned out to be structurally sound (removed them when they really did not need to be removed).
- One method, ILFC-TEP, will generally pass every tank as long as the source of contamination (is discovered during the testing) is determined to be anything other than the tank.
- The correct application of these methods is dependent on the individual performing the test.

- There is no guarantee that the steel tank has no corrosion holes, and once the lining deteriorates, a tank leak could occur.
- The UST Owner could be spending $8000 - $10,000 on an impressed current system on a tank that already has corrosion holes.
- Some tests give "inconclusive" results.

Several Louisiana UST contractors have stated that they witnessed tanks failing MTCF or TSS assessments in 1998 and 1999, and upon removal of the tanks, discovered no corrosion issues on the tanks that failed the alternative integrity assessments. UST contractors have also stated witnessing removal of fiberglass and STI-P3 tanks that were inadvertently removed after failing alternative integrity assessments (assuming the tanks were steel).

Estimated Costs:
Tank lining inspection by NLPA 631 Method:
$8000 – $10,000 per site for the lining inspection
$5000 per tank to re-line if lining fails and steel thickness passes
$8000 -$10,000 per site to install impressed current system if tank thickness between 75-85%
Tank closure if lining inspection fails and tank thickness <75%

Tank lining inspection by KWA Method:
$1500 - $3000 per tank for lining inspection
$8000 - $10,000 per site for manned internal inspection if steel thickness prediction fails
$5000 per tank to re-line if lining fails and steel thickness passes
$8000 - $10,000 per site to install impressed current system, plus cost of re-lining ($5000 per tank)
Tank closure if lining inspection and tank thickness fail

Alternative integrity assessments plus addition of impressed current system:
$2000 – $3000 per site for the integrity assessment
Tank closure if assessment fails, or internal testing and tank repair if needed
$8000 -$10,000 per site to install impressed current system

Proposed Louisiana Alternative Assessment Procedure:

Allow installation of impressed current systems with two tank tightness tests, one prior to and one between three and six months after installation of the impressed current systems. In addition, require that the facility does not use inventory control or manual tank gauging as a release detection method, and require that the facility perform an annual tank tightness test on all upgraded tanks. Following are considerations to be evaluated for this option:

- This method would be just as protective as alternative integrity assessments, because neither method gives an absolute thickness of the steel or an absolute determination of no corrosion holes.
- Adding annual tank tightness testing to this option would afford increased monitoring, that is not currently required at upgraded sites. This additional monitoring can be used to gather data for future rule-making if releases from these systems are occurring more frequently than systems upgraded using other options.

- Small tank owners and owners with many lined tanks may be able to afford to upgrade their systems, if tank testing were allowed as an alternative, as this method would be more affordable.
- Allowing this method would better protect the rural fuel supply by keeping more locations open.
- Allowing this option will provide tank owners with an option to comply with the 10-year lining inspection deadline. Scheduling internal lining inspections or alternative integrity assessments in time to meet the deadline is difficult due to the limited number of contractors available to perform these services.
- There is no guarantee that the steel tank has no corrosion holes, and once the lining deteriorates, a tank leak could occur.
- The UST Owner could be spending $8000 - $10,000 on an impressed current system on a tank that already has corrosion holes.
- EPA concluded in 1987 that 50% of corrosion holes in steel tanks were plugged with either soil, tank sludge, or rust plugs and did not leak, and approximately 7% of steel tanks 12-15 years old were leaking.
- EPA obtained information from industry experts that adding corrosion protection to steel tanks can cause rust plugs to loosen, triggering releases after corrosion protection is applied. Information provided by the State of Mississippi does not indicate this is taking place in their state.

Estimated Costs:
Tightness testing plus addition of impressed current system:
$200 – $450 per tank for the tightness testing
Tank closure if tightness testing fails, or internal testing and tank repair if needed
$8000 -$10,000 per site to install impressed current system

Approximate Costs:

Tank Lining Inspections:
NLPA 631 (manned entry) - $8000 - $9000 per site
KWA or Petroscope method (video camera and soil sampling) - $1500 - $3000 per tank
These are for testing only, not corrective actions to repair or replace liners or adding CP

Alternative Integrity Assessments:
MTCF - $2000 - $3000 per site
ILFC-TEP - $3000 per site
KWA or Petroscope - $1500 - $3000 per tank

Tank Tightness Testing:
$200 - $450 per tank

Adding Impressed Current Systems:
$8000 - $10,000 per site

Adding Internal Liner:
$5000 per tank

Release Detection Costs:
Statistical Inventory Reconciliation - $15 - $100 per tank, depending on the method used
Automatic Tank Gauge installation - $5000 - $12,000 per site, depending on the ATG installed
Inventory Control and Tank Tightness Testing (expires 10 years from upgrade) – free plus cost of TTT every 5 years
Interstitial Monitoring – Double walled tank or impermeable barrier required
Release Detection Devices (water or vapor monitoring) – Cost to install wells ($1000 per well plus travel expenses) plus permeability assessment if in native soil, plus cost of vapor monitor

Decision:

LDEQ has evaluated the information and cost discussed above and has determined that it is in the best interest of the citizens of Louisiana to allow an alternative tank integrity assessment in Louisiana. This alternative assessment method will be to allow installation of impressed current systems on steel tanks where internal liners were previously installed to meet tank upgrade requirements, provided that the tanks pass an initial tank tightness test and certain other conditions are met. These alternative assessment requirements are that tank tightness tests are conducted, prior to and between three and six months after installation of the impressed current systems and annually thereafter. In addition, this method will require that the facility does not use inventory control or manual tank gauging as a release detection method. This alternative assessment will be as effective as current alternative assessment methods allowed by EPA to evaluate tank integrity and will have additional safeguards in place regarding release detection and annual tank tightness testing. This decision has been made in consideration of the impact closure of these facilities would have on our fuel supply in rural areas, the impact on small business owners in the State of Louisiana, impact to the Motor Fuels Underground Storage Tank Trust Fund, the effectiveness of the alternative assessment method in comparison to what is currently allowed by EPA and neighboring states and protection of human health and the environment. Underground Storage Tank owners will have to make business decisions to determine if use of this alternative method is in their best interest based on the cost of the installation of corrosion protection, routine maintenance and testing of the corrosion system, expected facility life and throughput, future use of alternative fuels that may not be compatible with tank liners, cost of closure and cost of new tank installation. In addition, LDEQ intends to closely monitor these systems, and if a significant increased incidence of releases from these systems is documented, plans to initiate rulemaking to require removal of these tanks within a specified time frame.