

FAQs from the NWGLDE

... All you ever wanted to know about leak detection, but were afraid to ask.

ATG Probe Performance with Ethanol Fuels

In this issue's FAQs from the National Work Group on Leak Detection Evaluations (NWGLDE), the Work Group discusses the ability of ATG probes to perform leak detection in tanks containing ethanol fuels. (Please Note: the views expressed in this column represent those of the work group and not necessarily those of any implementing agency.)

Q. Are there any automatic-tank-gauge (ATG) probes listed by NWGLDE that are suitable for leak-detection monitoring of USTs containing alternative gasoline-ethanol blended fuels?

A. The short answers are "no" for ethanol or ethanol-gasoline blends with high percentages of ethanol, such as E85, and "maybe" for ethanol-gasoline blends with low percentages of ethanol, such as E10. There is just not enough information and data available on the use of ATG probes in ethanol-gasoline blends with low percentages of ethanol such as E10 to make a call at this time. Stay tuned.

When discussing the performance of ATG probes in ethanol or in ethanol-gasoline blends with a high percentage of ethanol, two main issues have to be addressed—material compatibility and leak-detection functionality. Unfortunately, the third-party leak-detection evaluations that NWGLDE members review do not address the *material compatibility* of any type of leak-detection equipment. Therefore, NWGLDE is unable to make any representation as to the compatibility of leak-detection equipment with the product stored (see the last "specific" NWGLDE disclaimer statement under "Disclaimer" at nwglde.org/disclaimer.html). However, literature distributed by certain ATG leak-detection equipment manufacturers indicates that there are probes available that have been designed to address material compatibility issues with regard to fuels containing a high percentage of ethanol. For information concerning material compatibility with alternative fuels containing ethanol, please refer to LUSTLine #52 (May 2006). Also see the Petroleum Equipment Institute's website, which lists ethanol-compatible equipment based on manufacturers' claims (<http://resource.pei.org/altfuels/guide.asp>).

The *leak-detection functionality* of ATG probes used in USTs containing ethanol or ethanol-gasoline blends with a high percentage of ethanol is something that could be addressed in third-party evaluations. NWGLDE has not learned of any such evaluations conducted, to date. This is probably because USEPA ATG testing protocol only requires ATG evaluations to be performed with either gasoline or diesel, although it allows ATG manufacturers to specify other fuel types in which they believe their equipment will perform equally as well as the fuel type used during their evaluation.

Currently, NWGLDE lists the fuel that was used during the evaluation and other fuels that the manufacturer has indicated in the evaluation report (none of which currently include ethanol or gasoline-ethanol blends with a high percentage of ethanol). The listing also states: "Other liquids with known coefficients of expansion and density may be tested after consultation with the manufacturer." This means that a manufacturer can specify other liquids that can be used with the ATG without having to perform another evaluation.

Based on the limited information that NWGLDE has been able to gather to date concerning the physical properties of ethanol-water mixtures, NWGLDE believes that gasoline-ethanol blends with a high percentage of ethanol that come in contact with water produce a gasoline-ethanol-water blend that is *not* a liquid with a *known* coefficient of expansion and density. The reason NWGLDE believes this is because it is well documented that a significant percentage of water is absorbed into 100 percent ethanol before an increase in volume of the water-ethanol mixture takes place. This would affect density as well as thermal characteristics of the entire gasoline-ethanol-water blends.

Though NWGLDE has not been able to find any literature that provides information on the exact amount of water that will be absorbed by different gasoline-ethanol blends without a volume increase of the blends, NWGLDE is concerned that the amount of volume and density change will be significant enough to affect an ATG water-detection and/or the gasoline float's ability to detect a water ingress under high-water-table conditions.

USEPA ATG testing protocol requires that all ATG water-detection floats be evaluated to prove that they can detect water ingress into the tank. Why do regulators care about water ingress (a product-quality issue) when our goal is protecting the environment from product leaking out? Because as product and water-table levels change over time, water ingress could become product egress. Detecting water ingress is also very helpful for the UST operator who wants to keep water out of customers' vehicles.

To date, NWGLDE is not aware of any water-detection float that has been evaluated in tanks containing any percentage of gasoline-ethanol blends. Since a blend of water, ethanol, and gasoline has a lower density and less surface tension than water

alone, the water-detection float may not reliably detect water in the tank until the blend phase contains enough water to separate from the gasoline, settle to the bottom of the tank, and accumulate a high percentage of water versus ethanol.

It appears that some manufacturers have realized the potential problems associated with water detection in ethanol-gasoline blends because their literature indicates that they are marketing ATGs that do not include water-detection floats for use with ethanol-gasoline blends. However, the use of an ATG without a method to detect water ingress does not meet the requirements of USEPA ATG testing protocol. Whether an ATG that does not meet the USEPA ATG testing protocol is acceptable for leak detection or not is an issue for individual implementing agencies to resolve.

USEPA ATG testing protocol does allow for an alternative method of water detection. In this case, the ATG would be evaluated for its ability to detect a 0.2 gph water ingress rate by measuring the rise in product level with the product float in the same manner as if the ATG was measuring a 0.2 gph leak rate (in this case only the probe would detect a rise of product instead of fall of product). As discussed previously, a certain amount of water is absorbed by the ethanol in the gasoline-ethanol blends without an increase in volume of the ethanol. Therefore, this method may also be problematic in detecting water ingress because the increase in the product volume may not accurately reflect the volume of water that has entered the tank

The NWGLDE New Addendum:

In an effort to ensure that all methods of water-ingress detection are available for evaluation, NWGLDE has developed an addendum to the current USEPA ATG and NWGLDE CITLDS testing protocols that will allow an ATG to be evaluated to determine its ability to detect

water ingress into an ethanol-gasoline blends by using only the ATG's top liquid-level measurements capability. This addendum can be found on the NWGLDE website at nwglde.org/protocols.html.

Again, the NWGLDE is not aware of any ATG manufacturer that has performed an evaluation of their equipment in accordance with the USEPA ATG testing protocol, or the NWGLDE addendum, to address the *leak-detection functionality* related to the adequate detection of water ingress into an UST containing a gasoline-ethanol blend with a high percentage of ethanol. If such an evaluation is performed, the ATG listing will be found under "new/revised evaluations" on the NWGLDE website at nwglde.org/news_and_events.html. The NWGLDE invites any manufacturers who are contemplating such an evaluation or studying this issue to share their findings with us.

Until an ATG manufacturer performs an evaluation on its equipment to determine whether or not an ATG will adequately detect water ingress into an UST or until there is more research into the interaction of water in ethanol-gasoline blends with a high percentage of ethanol, a conclusion cannot be made on whether an ATG probe is suitable for use in these ethanol-gasoline blends with a high percentage of ethanol.

About the NWGLDE

The NWGLDE is an independent work group comprising 10 members, including 9 state and 1 USEPA member. This column provides answers to frequently asked questions (FAQs) the NWGLDE receives from regulators and people in the industry on leak detection. If you have questions for the group, please contact NWGLDE at questions@nwglde.org.

NWGLDE's Mission:

- Review leak-detection system evaluations to determine if each evaluation was performed in accordance with an acceptable leak-detection test method protocol and ensure that the leak-detection system meets USEPA and/or other applicable regulatory performance standards.
- Review only draft and final leak-detection test method protocols submitted to the work group by a peer review committee to ensure they meet equivalency standards stated in the USEPA standard test procedures.
- Make the results of such reviews available to interested parties.