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L.U.S.T.LINE

A Report on Federal & State Programs to Control Leaking Underground Storage Tanks

Now We're Talking!

What if we all Spoke the Same UST Language?

by Jon Kelly

Data. It's everywhere. We all want it to enhance our decision-making, improve our efficiency, and save resources. Who hasn't heard a boss say "show me the data" or "we need to be data-driven" in the last month, or maybe even in the last week?

There's not much debate that data generally helps drive better outcomes than instinct or experience alone. However, without timely and reliable access to relevant data, which can be spread across various incompatible databases, it can be hard to make data-driven decisions efficiently. To overcome this challenge, many industries have adopted standardized data protocols to streamline the sharing of data across different platforms and stakeholders.

For instance, in medicine, a data standard was developed to facilitate the exchange of electronic medical records, many of which were not compatible. Before the standard existed, insurance companies, hospitals, and other stakeholders spent countless hours and dollars on data management. Although the standard took time to develop, it has achieved widespread adoption and dramatically improved the efficiency of data management, resulting in better patient care and more efficient operations.

Like medicine, underground storage tank (UST) compliance is, in many ways, a team sport—many stakeholders interact to help mitigate risk and manage cost. Fuel retailers, regulators, service contractors, and testing companies all serve a role in the interconnected world of UST compliance, and they all need accurate, up-to-date equipment data to achieve their respective goals.

However, without digitally compatible data sets, stakeholders cannot share critical equipment data, which makes everyone's job harder and less efficient. With a normalized data structure that the whole industry agrees to adopt (like the one that exists in medicine), updates to existing databases will be seamless and new ones can be created rapidly.

So, are we as an industry going to wallow in our misery and complain about outdated, incompatible data, or are we going to do something about it? Are we going to struggle away in isolation, or has the time come for us to come together to develop and adopt normalized protocols, standards, and data bridges to facilitate the digital exchange of critical data between stakeholders?

Fortunately, our industry is already on the move.

Problem: No Common Language

Most folks who are involved with USTs know that "shear valve," "crash valve," and "fire valve," all refer to the same device at the base of a dispenser that automatically closes when a dispenser is hit by a car.

But would two people—even those trained in USTs—necessarily realize that "composite tank," "Buffhide tank," "ACT-100 tank," and "fiberglass clad tank," all refer to a steel tank with an exterior coating of fiberglass? Eventually, the two UST gurus talking about Buffhide tanks would probably realize through conversation that all these terms refer to the same kind of tank.

Table of Contents

L.U.S.T.Line

Michelle St. John, Editor, NEIWPCC Information Officer

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However, as more and more UST owners, inspectors, maintenance personnel, and regulators use real-time, cloud-based, and mobile technology to monitor and manage fueling equipment online, our industry is becoming increasingly reliant on computer programs to interpret data. Unfortunately, computer programs don't have the luxury of discussing what words mean the way people do. Computers need a common language—known as a "standardized data protocol"—to exchange information accurately and reliably.

At present, however, there is no data protocol to describe fueling equipment. This decreases human productivity, curbs the positive impact of technology, and limits innovation potential in our industry. The lack of a data protocol for UST equipment explains why it took the EPA analyst so long to compile data from 53 states and territories for UST Finder, only to have to turn around and start the refresh effort as soon as it was launched. Ugh.

So...if no common "computer language" exists, how do you create one?

Solution: A Universal "Data Protocol"

To address this problem, a few members of the Petroleum Equipment Institute (PEI) approached PEI staff in 2019 with a proposal to tap into PEI's collective wisdom to standardize the structure and terminology used to describe fueling equipment. Given PEI's position as the leading authority and source of information for the fuel and fluid handling equipment industries, it seemed like the right place to start.

The development of standardized data protocols is challenging and requires a disciplined framework. Although PEI has a robust process for developing recommended practices to be used by people, developing a data protocol to be used by computers presents unique challenges.

Fortunately, there is a standards development organization in the petroleum industry that provides a framework for this type of effort. Conexxus is an independent, not-for-profit organization that spun out of the National Association of Convenience Stores (NACS) Technology Project in 2004. Conexxus' mission is to improve the financial success and viability of the retail petroleum and convenience industry through technology.

Conexxus has developed payment (mobile, loyalty) and point-of-sale data exchange standards, to name a few. In fact, there is even an existing data protocol (Conexxus calls it a "site asset data standard") that defines the structure and terminology of most of the equipment found at a convenience store (c-store). Unfortunately for PEI members, underground storage tank equipment was excluded from Conexxus' original site asset data standard.

PEI & Conexxus Collaboration

PEI members and staff approached Conexxus to discuss including UST equipment in the existing site asset data standard. Doing so would help both NACS and PEI members leverage technological solutions that streamline UST-related business processes and operations.

In May 2019, Conexxus formally approved this new work item. Conexxus and PEI began to collaborate on the initiative: Conexxus agreed to provide the development framework and PEI agreed to provide the collective UST expertise of its members.

What Standardized UST Data Does—and Doesn't—Look Like

"Standards are powerful tools that can help drive innovation and increase productivity. They make organizations more successful and people's everyday lives easier, safer and healthier. We are excited to collaborate with and provide the guardrails of our process to take PEI members' collective knowledge and turn it into a standard that everyone can benefit from." ...Linda Toth, Conexxus

Without a standard protocol, Retailer A might input UST data into a database like this:

Retailer A		
Tank Status	**Tank Type**	**Leak Detection**
Currently in use	Fiberglass Double Wall Fluid Containment Brine Filled	Piping Sump Sensors Interstitial Monitoring ATG and interstitial piping float sensor

Although this is accurate, it doesn't help a computer that is trying to determine the primary leak detection method for the tank.

Meanwhile, Retailer B might input UST data about an identical tank into a database like this:

Retailer B			
Status	**UST Configurations**	**Construction**	**Primary Release Detection**
CIU - Currently in use	DW - Double Walled	FRP-Fiberglass Reinforced Plastic	Interstitial Monitoring

Retailer A could program his computer to read his data. Retailer B could program her computer to read her data. But Retailer A's computer and Retailer B's computer could never directly communicate UST information to each other.

For computers to efficiently and accurately process UST data, we have to break the data down into discrete fields that describe a single element or property of an UST component. A standard data protocol also defines a limited set of possible values for each field. For instance:

Standard Data Protocol				
Tank ID (list #)	**Operational Status (pick one)**	**Wall Type (pick one)**	**Primary Material (pick one)**	**Primary Release Detection (pick one)**
Any # is acceptable	Unknown	Unknown	Unknown	Unknown
	In Service	Single Wall	Steel	none
	Temporarily out of Service	Double Wall	Fiberglass	Inventory Control
	Removed	Triple Wall		Manual Tank Gauging
	Closed in Place			Tank Tightness Testing
	Abandoned in Place			Automatic Tank Gauging
				Vapor Monitoring
				Groundwater Monitoring
				Interstitial Monitoring
				Statistical Inventory Monitoring
				Other Method

Retailer A's and Retailer B's tanks would then be described as follows:

Retailer A and B Using a Standard Data Protocol				
Tank ID	**Operational Status**	**Wall Type**	**Primary Material**	**Primary Release Detection**
1	In Service	Double Wall	Fiberglass	Interstitial Monitoring
2	In Service	Double Wall	Fiberglass	Interstitial Monitoring

Each field of the data protocol (illustrated in the third table above) describes a single element or property of an UST component using standardized terms. Completely describing an UST system requires defining many more fields and standardized terms than are contained in the table above.

Once the data protocol is established, any database built according to the data protocol can be readily understood by any computer that has been programmed in accordance with the data protocol. This means different apps, software programs, and databases that contain UST data can work together seamlessly.

What Progress has Been Made?

PEI developed a small task force to lead this initiative, including Scott Boorse (PEI), Jon Kelly (Canary Compliance), John Ryder (Canary Compliance), and Marcel Moreau (Marcel Moreau Associates).

Throughout 2019 and 2020, this task force solicited feedback from PEI members, retailers, regulators, and other key stakeholders. Outreach efforts included:

- Roundtable discussion at 2019 PEI Convention.
- Meetings with EPA's Office of Underground Storage Tanks and state UST regulators.
- Call for volunteers to provide feedback in PEI's December 2019 "TulsaLetter."
- Presentation at PEI Young Executives Conference in February 2020.
- Virtual peer review with 45+ PEI members in May 2020.
- Deep-dive feedback review with more than 15 PEI members October through December 2020.
- Virtual presentation with EPA at the 2020 PEI Convention, highlighting data standards effort and UST Finder.

Responses have been enthusiastic and positive from both industry and regulators. Ed Kubinsky, director of regulatory affairs at Crompco, said, "In the UST world, equipment data is shared between owners, consultants, testers, data analysts, and regulatory agencies. A standardized way to share data [for reporting, tracking exceptions, etc.] makes life a lot simpler for everyone involved and makes data useful for everyone's needs across all their different systems."

Mahesh Albuquerque, from Colorado's Division of Oil and Public Safety, describes the need for standardized fueling equipment data as "critical" to improve operational and policy decision-making. Albuquerque said, "If regulators and the tank owner/operators we regulate all used the same protocols, it would enable data sharing and data transfers, creating efficiencies and spurring innovations that enable us all to be more successful in our core missions."

Acting Director of EPA's Office of Underground Storage Tanks (OUST) Mark Barolo, said, "EPA and our state implementing partners use a wide range of terms for different fuels and pieces of equipment for UST systems. A voluntary common language and standardized data protocol approach is an idea whose time has come and OUST enthusiastically supports this effort. Common language would offer greater opportunities to compare and share data among UST professionals, offering numerous opportunities to enhance UST release prevention and cleanup."

This enthusiasm is encouraging, but since data protocols are an unfamiliar concept for many in the petroleum equipment community, the task force has worked hard to clearly define and communicate the objectives of this effort to ensure broad alignment among stakeholders.

Scott Boorse, director of technical affairs at PEI, said, "At first, people might think we're proposing a new software product or database. We're not. What we are talking about is the language or protocol that serves as the 'underbelly' of any online tools that incorporate fuel equipment data, such as state registration databases, remote monitoring tools, or mobile inspection apps."

Marcel Moreau provides further clarification: "We're not suggesting everyone throw out their existing UST databases and create new databases that are consistent with this data protocol. Instead, we are proposing an industry standard for voluntary adoption by anyone who sees the advantages of a common, carefully defined UST data protocol.

Stakeholders with an existing database can choose to: 1. Ignore the proposed protocol. 2. Use the protocol going forward while maintaining an incompatible legacy database. 3. Migrate existing data to the new data protocol."

Where Does this Effort Stand?

By the end of 2019, a first draft of the data protocol was developed. In May 2020, a volunteer group of approximately 45 PEI members reviewed the draft to provide general feedback on its content and business relevance. A smaller group of volunteers then conducted a deep-dive review with the task force in late 2020, and—as of early 2021—their feedback is being incorporated into the standard. The output of the project will be:

- A standard UST data protocol that specifies the terms to be used to describe UST equipment and how these terms are organized in a database.
- An implementation guide to support adoption, implementation, and migration of existing data to the new structure.
- A communication effort to promote adoption, market recognition, utilization, and adherence to the data protocol by industry stakeholders.

What Does the Future Hold?

Stakeholders recognize that full industry adoption will not happen overnight. But the development of this data protocol is a critical element as the industry integrates new technology into daily operations.

Moreau notes that "over time—potentially quite a long time—communication concerning fuel system testing, inspection, and compliance will improve as IT vendors, PEI members, UST owners, and UST regulators adopt the new data protocol. Data accuracy will improve as stakeholders use the same term for the same UST component, driving better business outcomes. The first step, however, is to create this standard so that it is available for people to use."

Maybe one day we'll live in a world where a technician can install fiberglass tanks at a site, use a mobile app to immediately update the associated equipment database, while simultaneously synchronizing state records and the national UST Finder database. No more time and money wasted figuring out what equipment is where.

Until we get there, the project task force remains hard at work on this effort and continues to welcome your input and support.

If you have employees, customers, or other contacts that would like to get involved, please feel free to contact Marcel Moreau (marcel.moreau@juno.com), Scott Boorse (sboorse@pei.org) or Jon Kelly (jkelly@cancomply.io).

Jon Kelly is the founder and CEO of Canary Compliance, a technology company that provides smart, simple, and affordable remote tank monitoring software.

New National Dataset and Web Mapping Application for USTs and LUSTs

by Alex Hall and Fran Kremer

In September 2020, U.S. EPA's Office of Research and Development, Office of Underground Storage Tanks, and the Association of State and Territorial Solid Waste Management Officials (ASTSWMO) released UST Finder—the first national dataset and web mapping application on underground storage tanks, underground storage tank facilities, and leaking underground storage tanks.

Since its public release, EPA and ASTSWMO have given five regional workshops discussing the utility and applications of UST Finder. These workshops were useful settings to engage with a wide variety of UST and LUST stakeholders, including state and federal regulators, water utilities, and the emergency response and redevelopment communities. The discussions included perspectives on routine operations, cleanup activities, and the impact of extreme weather on USTs and LUSTs.

UST Finder provides EPA, states, tribes, and territories with a tool to locate the regulated universe. There have been approximately 2.2 million underground storage tanks installed in the U.S. and more than 550,000 documented releases since 1989. The proximity of people, surface and ground water, infrastructure, and sensitive ecosystems to our USTs and LUSTs is critical in assessing risk and determining vulnerability to human health and the environment.

To answer these critical questions EPA collected public UST and LUST data from all 50 states, the District of Columbia, territories, and Indian country. From this data, we stitched together a national composite of both our active and closed USTs and LUSTs. This snapshot of information was then mapped, and now for the first time, regardless of where one lives in the U.S., UST Finder will inform regional, state, and local personnel, as well as individuals, the answers to questions such as:

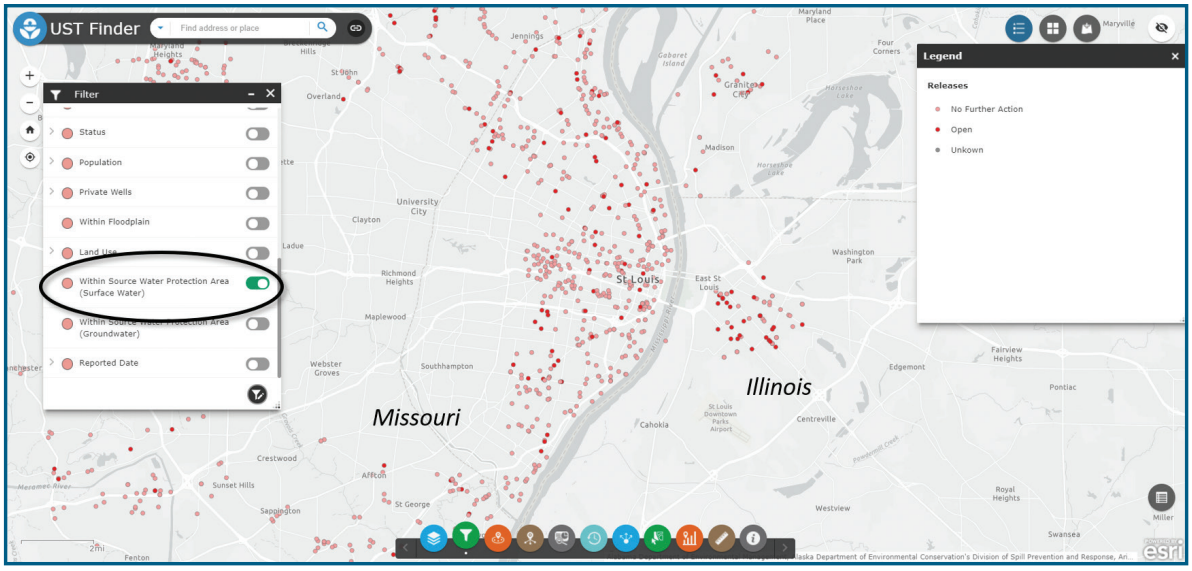

Figure 1 *Leaking underground storage tanks (Open and No Further Action) within a surface water, source water protection area.*

- Is there a leaking underground storage tank near a home?
- Are there USTs near drinking water wells?
- Is a home vulnerable to petroleum vapor intrusion from a leaking UST?
- Is the UST in a floodplain?

If there is a petroleum release from an UST, that substance's transport is most likely predominantly driven by water, and that water may have contaminants, such as benzene.

Through surface water or groundwater transport, released product can find its way into public and/or private drinking water supplies. To link the risk of drinking water contamination with UST releases, UST Finder contains two key datasets to help inform stakeholders of the nexus between LUSTs and drinking water.

From recent EPA analysis, 17% of people in the U.S. get their water from private domestic wells. These wells are not federally regulated, and until recently, there wasn't a dataset on where these wells were located nationally. To assess the vulnerability of private wells to LUSTs, EPA researchers developed a method that estimates well densities for all 20 million census blocks in the U.S. This model is leveraged within UST Finder to inform users of wells near USTs and LUSTs. A user can open UST Finder, select a leaking UST and discover how many private wells are estimated to be nearby. This functionality can be used by states and EPA regulators to make informed assessments on potential risks to private drinking water receptors and to help in screening to prioritize site cleanup.

There are more than 200,000 community and non-community public drinking water intakes in the U.S.: transient and non-transient supplies. Transient water systems provide water in places such as gas stations, where people do not remain for long periods of time. Many of these systems are located

at UST facilities, providing water at places such as associated convenience stores. These intakes draw from surface or ground water. U.S. EPA's Office of Water provides spatially referenced source water protection areas (SPAs) for these water systems, within their Safe Drinking Water Information System. These SPAs show areas of interest for the protection of surface and ground water sources of drinking water.

UST Finder leverages this information by identifying the locations of the LUSTs and USTs and the potentially impacted water provider. Users of UST Finder can quickly filter contaminated sites by their locations within drinking source water protection areas, as shown in Figure 1. This feature is especially useful to water utilities.

The America's Water Infrastructure Act of 2018 (https://www.epa.gov/waterresilience/awia-section-2013) requires community water systems serving more than 3,300 people to conduct risk and resilience assessments and update emergency response plans; risks that may result from UST and LUST facilities. UST Finder can help utilities conduct these assessments by identifying sites within federal SPAs or user defined SPAs.

Lastly, UST Finder is an especially important tool for those sites near state borders. Where contamination crosses state lines, this tool provides important information to adjoining states on the potential for cross boundary contamination and impacts on drinking water supplies.

While UST Finder contains valuable spatial information on UST and LUST universe, it also provides us with the first national perspective on important trends such as the age of infrastructure over time, changing fuel types, rate of removals and installations, and tank capacities.

To highlight just a few pieces of data that can be explored in UST Finder, Figure 2 shows the installation years of open USTs from 1970 to 2018. We see that 30% of the universe is more than 30 years old, and the average age of our systems is 25 years. The age of our infrastructure has implications for corrosion, insurability, rate of replacements, fuel compatibility, and the possibility of system failure. Data within UST Finder shows that the average capacity of USTs has been rising year after year. Average tank capacity has doubled since 1989, from about 8,000 to 15,000 gallons. Tanks are getting bigger and staying in the ground longer; since 1989, the average lifespan of USTs has almost doubled, from 18 years to just above 30 today.

During the regional workshops noted earlier, we asked state regulators for specific case studies on USTs and LUSTs impacted by extreme weather events. There was no shortage of examples. Discussions of wildfires in the West, flooding, and tornados in the Midwest, hurricanes in our coastal communities, and even dam failures in Michigan were some of the extreme events that impacted UST facilities. The discussions reflected data NOAA recently released: 2020 set a record on billion-dollar weather and climate disasters, with 22 in total (https://www.ncdc.noaa.gov/billions/).

Knowing where our UST universe is located can both proactively help prevent some of the worst-case scenarios for UST systems and reactively help identify sites impacted by extreme weather events. UST Finder can help identify vulnerable USTs and LUSTs. As the application is available on desktop and handheld devices, it can readily be used by responders in the field to make decisions.

Within the application, users can quickly query to see if a particular UST or LUST is within a floodplain, as seen

> The proximity of people, surface and ground water, infrastructure, and sensitive ecosystems to our USTs and LUSTs is critical in assessing risk and determining vulnerability to human health and the environment.

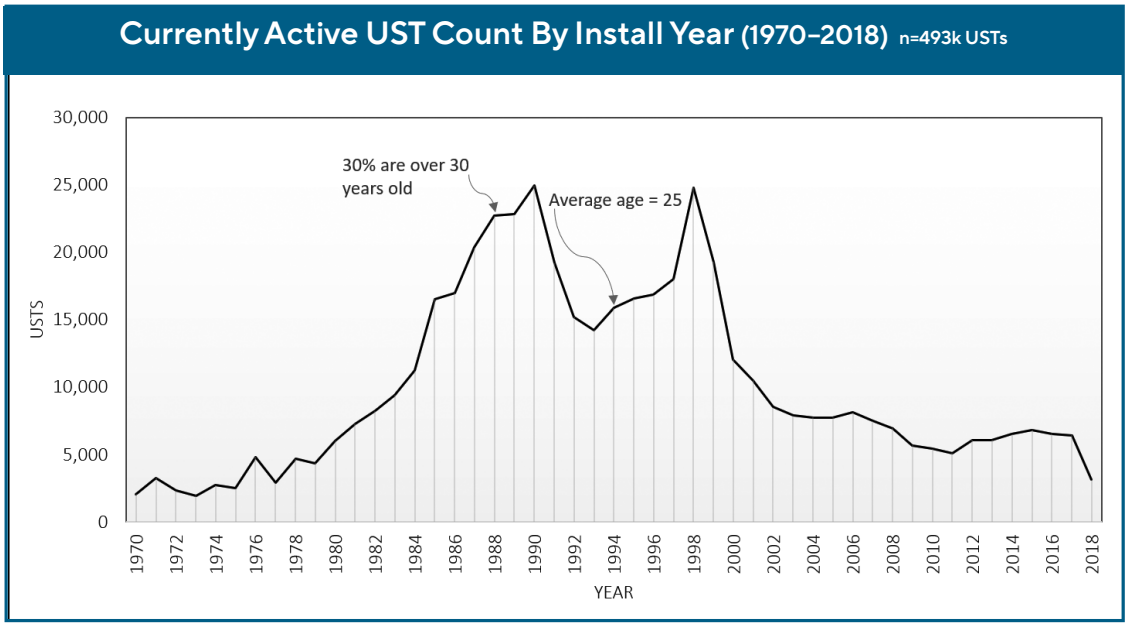

Figure 2 *Active USTs by installation year*

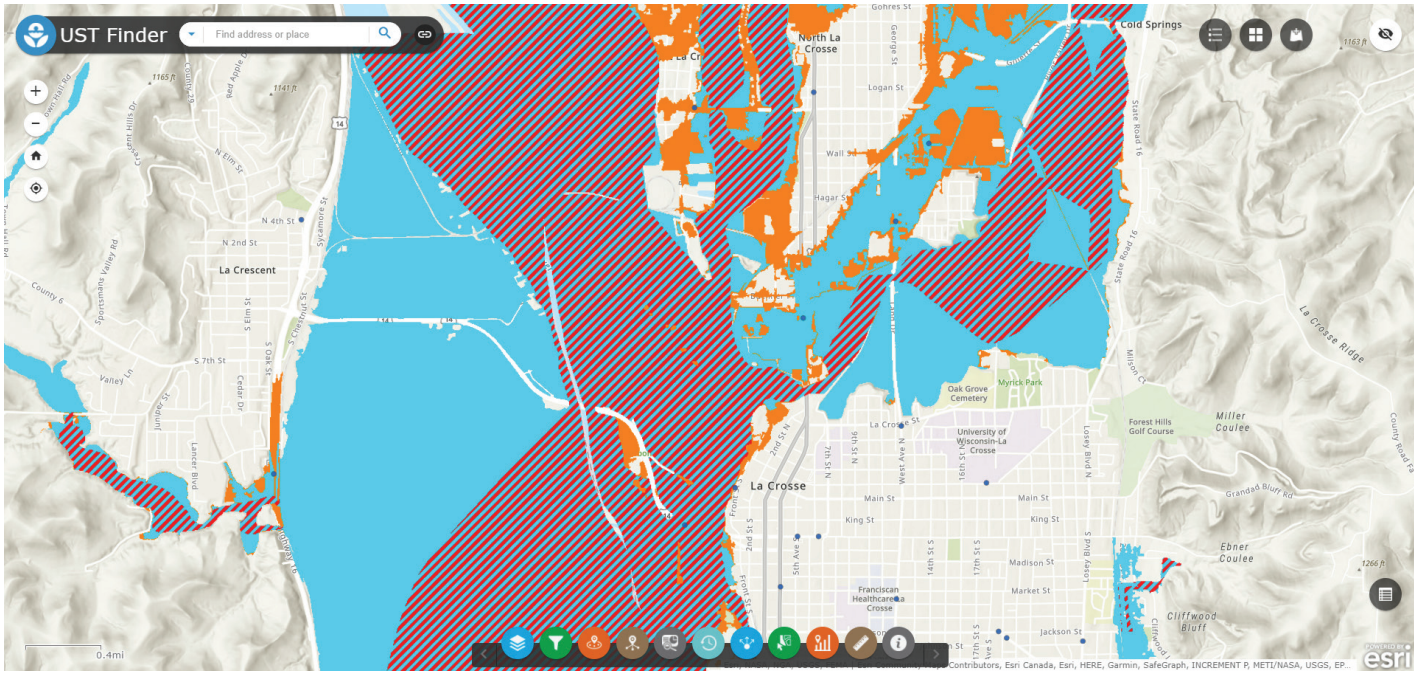

Figure 3 *FEMA Flood Insurance Risk Map within UST Finder. Identified are UST Facilities (blue points) and tanks within FEMA's 1% annual chance of flood hazard (light blue area), regulatory floodway (red and blue dashes), and .2% annual change of flood hazard (orange area).*

in Figure 3. We estimate that there are 33,000 USTs within these floodplains—holding up to a quarter million gallons of fuels and other hazardous substances. NOAA data can be brought into UST Finder so that facilities within high tide flooding, storm surge, or predicted sea level rise areas can be easily identified.

UST Finder was also used post-Hurricane Laura to aid EPA Region 6's response effort in identifying facilities subject to inundation. Near-real time wildfire parameters are also built into the application, showing the co-locations of burn areas and USTs. U.S. EPA's Office of Underground Storage Tanks (OUST) is presently developing a wildfire guide, and UST Finder will serve as an important companion to this effort, providing geospatial data to emergency responders and site personnel in identifying areas vulnerable to wildfires and those directly impacted.

In brief, weather-related disasters are becoming more intense and more frequent, leading to more severe and frequent stress to USTs. The data within UST Finder can help identify systems vulnerable to such stress. This can better prepare owner/operators and regulators for the likelihood of an extreme weather event, to bolster those facilities vital for evacuation routes, and assist in recovery operations.

A 2017 survey of the states regarding UST facilities and their needs in emergency response focused on several aspects, including the need for facility geospatial data, as well as flooding information and inter-state communication. UST Finder is a vital tool in delivering this information in an accessible way, from emergency responders to site cleanup personnel.

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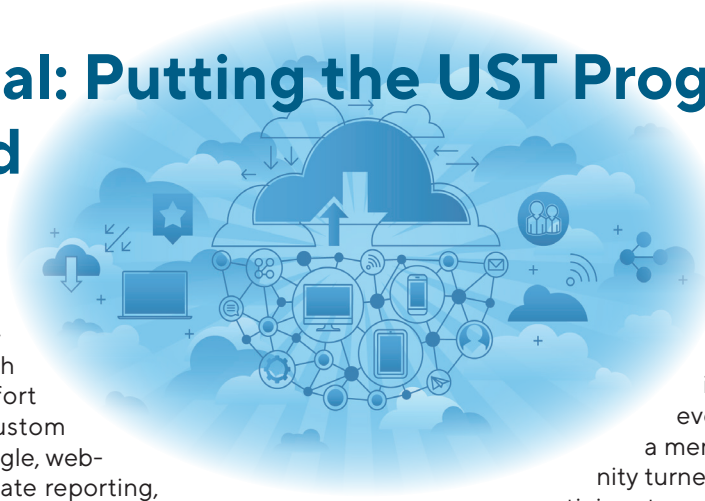
UST Finder 2.0

EPA is collaborating with ASTSWMO and the states in developing the next version of the application, UST Finder 2.0, including a virtual exchange service. This version is designed to provide more real time data on UST systems. This includes a centralized data repository to facilitate the transfer of data with states, territories, and tribes; automating data extraction; and facilitating data transfer for states without web services. UST Finder V2.0 will capture more detailed data on the infrastructure, sites, remedial efforts, and impacted receptors.

For infrastructure, considering data protocols such as PEI and Connexus's

continued on page 12

Going Digital: Putting the UST Program in the Cloud



by Diana Foss

The Oregon Department of Environmental Quality (DEQ) is on the path of a massive, agency-wide effort to replace dozens of aging custom database applications with a single, web-based platform that will integrate reporting, permitting, invoicing, payments, and enforcement. Known as YourDEQ Online or YDO, this new cloud-based resource will provide the regulated community with online access to historical facility data and offer the ability to complete permitting and reporting requirements online. Oregon DEQ staff will also benefit from the automated workflows and instant access to documents from anywhere, including electronic tablets used in field work.

UST Compliance Joins the Effort

Parallel with this effort, the Oregon Underground Storage Tank (UST) Compliance program is on its own path, sorting and culling over 30 years' worth of paper files in preparation for scanning and making them available to the world via the Oregon Records Management System or ORMS. Together, these two projects will make the whole history of USTs in Oregon visible online. We anticipate a substantial decrease in public records requests once members of the public can research the history of UST facilities online and believe that access to such a large baseline of data will make possible applications that we can't even imagine right now.

How Did We Get Here?

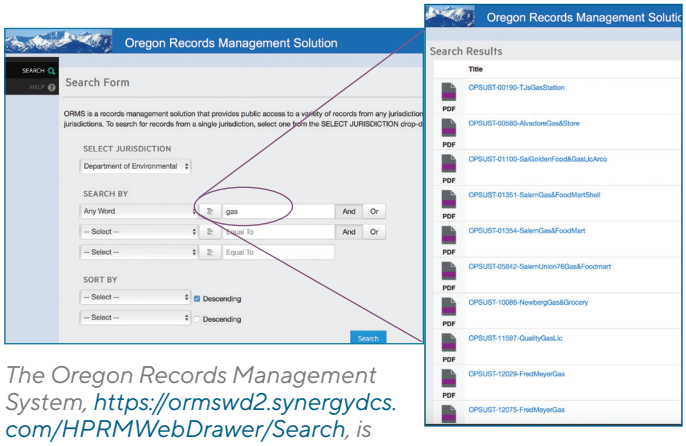
YDO had its genesis with the National Pollutant Discharge Elimination System Electronic Reporting Rule or NPDES eRule, which moved reporting and data sharing from paper to online systems. Alongside that requirement was the Cross-Media Electronic Reporting Rule (CROMERR), which governs proof of identity for these electronic submissions. Oregon DEQ leadership realized that these federal requirements would apply to a growing swath of programs within the agency, and that it made little sense for individual programs to continue to develop bespoke applications. The agency selected a vendor with a platform designed for environmental regulatory agencies that allows for configuration of screens and workflows without expensive modification of the underlying code.

Mapping Processes for Digital Success

Although the focus in large software projects is usually on the software itself, it is also important to have a firm grasp of the processes and workflows that the software is supposed to be automating. Like our counterparts across the country, Oregon's UST Program uses a custom database application developed in the 1990s. But our interactions with our permittees have always happened in person, on the phone, and through hundreds of thousands of documents. Even our website has mainly been a source of forms to print and fill out.

The first step for the UST program was to look at all our processes and turn them into flow charts. Approving installations, putting sites in temporary closure, renewing service provider licenses: every structured interaction with a member of the regulated community turned into a workflow, with defined participants, responsibilities, and inputs and outputs. In some cases, this experience led us to reconsider our old way of doing things. In other cases, we've unearthed processes that had been one person's responsibility for so long that they didn't even make it into the original list. The result of this work was a system configuration document, which the vendor will use to make their platform work for the UST program.

Now comes the task of looking at the process documentation and the forms involved and identifying gaps, as well as what changes we must make for the new system. Then we must plan and implement training for both internal and external users of the system. And don't forget testing the software itself! It is a big, complicated process. But the end goal is well worth the time and effort.



The Oregon Records Management System, https://ormswd2.synergydcs.com/HPRMWebDrawer/Search, is a documents database available to every jurisdiction in the state, providing extensive search capabilities for publicly-available documents. Users can search for title words or for text within the documents.

Behind the Scenes of Record Management

Concurrent with the agency-wide effort of building and launching YDO, the UST program is also engaged in making all our paper records available electronically. As described earlier, throughout the history of the program, our interactions with the regulated community have involved paper, so this is a lot of pages—well over 700,000 by our initial estimate. When COVID-19 handed us lemons (keeping our inspectors out of the field), we made lemonade and used their newly available time and expertise to cull and sort our facility files.

We approached the file preparation from a public records

perspective; keeping only those documents that meet the criteria for public records. For each document, the inspector determined whether it is:

- Prepared, owned, used, or retained by a state agency.
- Related to an activity, transaction, or function of a state agency.
- Necessary to satisfy the fiscal, legal, administrative or historical policies, requirements, or needs of the state agency.

We discarded a lot of paper tapes from automatic tank gauges, equipment manuals, and duplicate documents, although we also created "convenience copy" folders of documents that would not be scanned but are useful to have in the interim.

We considered different ways to organize the folders. After testing out folders broken out into different "events," such as inspections, enforcements, modifications, decommissions, installations, and other, the inspectors agreed that the most useful format was pure reverse chronological order. As one of our inspectors put it:

"One reason to maintain the files in chronological order is to preserve the narrative the files construct. The files tell a detailed story of the facilities and their history with DEQ through notes, emails, permit applications, enforcements etc. ...[To] deconstruct the story into single topics, components, or issues breaks the continuity of the documents and many of the important details may be lost."

The Benefits of Digitizing

The Oregon Records Management System is a state-wide electronic records repository. Administered by the Secretary of State's office, ORMS automates retention schedules and provides public access to uploaded documents through a powerful set of search capabilities. Another DEQ program, the Onsite Wastewater Management program, which regulates residential septic systems, uploaded all its records to ORMS several years ago, and saw a massive decrease in the time staff had to spend on public records requests (PRRs) once the documents were available online. Although we don't receive nearly the same volume of PRRs, the UST program is hoping for a proportional time savings.

In addition, we're also making possible applications we can't currently imagine. Given the long-term environmental effects of LUSTs, DEQ decided to extend the retention schedule for our UST records to 100 years after decommissioning, up from our previous 30 years. By making these records available with powerful search capabilities, and keeping them available for a very long time, we are opening the door to analysis and mapping that hasn't been possible. Although the UST program is also improving our own mapping capabilities, I predict that outside entities will find uses for these data that would never occur to me.

Improved Efficiencies

The combination of YDO and ORMS will make a direct improvement in how our inspectors do their jobs. Currently, an inspector will prepare to visit a site by printing out a facility report from our UST database, finding, pulling, and reading the paper facility file, and perhaps researching the details of previous enforcements in a different database application. The inspector will look up the facility on Google Maps, drive over to the site, and do the inspection. If there are violations, the inspector will return to the office and fill out a field citation from a book of carbon copies, tear out and send it to the permittee, and scan and send a copy to me in the headquarters office. The inspector will also have to enter the exact same information into our enforcement database. Assuming they don't want to contest the citation, the permittee will sign it and mail it back to DEQ with a check payment for the fine, both of which the accounting office will also scan and send to me in HQ.

Awaiting their turn on the scanner, these boxes hold UST facility files from our Portland and Eugene offices, representing approximately two-thirds of the currently active facilities in Oregon. In each file is a complete history of the facility: inspections, enforcements, installations, modifications and decommissionings. Some of the files go back more than 30 years.

Once YDO is live and all our documents are uploaded into ORMS, an inspector will be able to pull up and review previous inspections either on a work computer or a portable tablet. The inspector will then be able to enter all the relevant information into YDO on the tablet and issue citation documents electronically to the permittee as needed.

Lastly, the permittee will be able to pay their fine with an ACH transfer or electronic check. Thanks to YDO and ORMS, these interactions and transactions will be stored in one place, making it easier to access and understand the story of a UST facility from the past into the future for DEQ staff, UST stakeholders, and the public.

Is Digitizing for You?

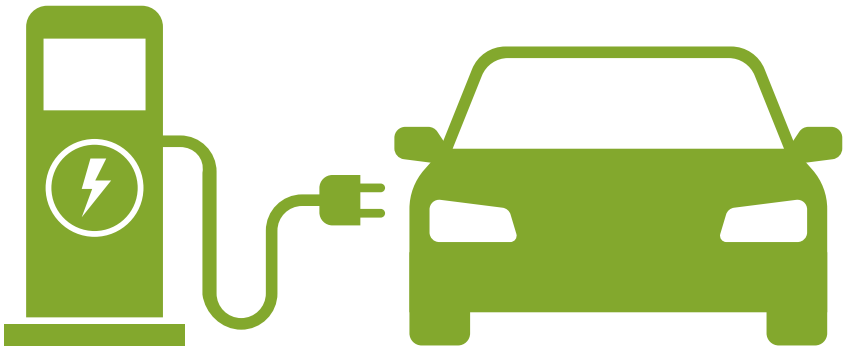
Both the scanning project and Your DEQ Online are enormous up-front investments of time and money that will pay dividends for years to come. Oregon DEQ has made YDO a top priority for the entire agency and is committed to delivering a platform that will support the work of all the programs involved. The UST file scanning project is smaller in scope, but we hope it will provide an example to other programs within the agency looking to move beyond paper documents. Oregon recently established an Open Data Program across state government with the goal of making available to the public all data created by state agencies. The UST program is proud to be at the forefront of that effort.

Diana Foss is a senior tanks policy analyst with the Oregon Department of Environmental Quality. She can be reached at: diana.foss@deq.state.or.us.

Electric Vehicles and the Future of Gas Stations

Preparing for a Radically Different Future of Fueling

by Matthew Metz



Four trends will profoundly shape the future of the gas station industry and associated federal programs, which insure and regulate USTs in the U.S.: the rise of electric vehicles (EVs), the consolidation of gasoline retailing, the aging of USTs, and increased regulation and political pressure surrounding gas stations.

The Phasing out of Gasoline-Powered Cars and the Rise of Electric Vehicles

Governments around the world are working to phase out the sale of gasoline-powered vehicles in an all-out effort to stave off the worst effects of climate change. Eighteen countries are planning to stop the sale of new gasoline powered vehicles between 2025-2040, and their numbers are growing.

In the U.S., gasoline combustion makes up about 17% of all carbon emissions. California, Massachusetts, and New York have all announced plans or targets to phase out the sale of new gas cars by 2035, and the Washington State legislature recently voted to set a goal to phase them out by 2030. The Biden Administration's infrastructure plan proposes to spend $170 billion on speeding the transition to electric vehicles, and its climate plan calls for carbon emissions cuts of 50% by 2030, cuts which will necessitate broad reductions in gasoline use.

Industry is joining the rush to move beyond gasoline. General Motors has announced that they will sell only EVs after 2035, and Ford has said that they will sell only EVs in Europe after 2030. Jaguar, Volvo, and Honda have announced plans to phase out the sales of gas cars in the U.S. by 2025, 2030, and 2040, respectively. Numerous automakers have announced that they will stop developing new gasoline engines.

Automakers are rapidly increasing their offerings of electric models to meet anticipated demand. The base electric version of the Ford F-150, America's bestselling vehicle, will go on sale in May 2022 at a price under $40,000. The Ford Mustang Mach-E SUV was released this spring and is available for about $43,000. A raft of new EV offerings is expected in the coming years. The sticker prices of new EVs are expected to be at or below the price of comparable gasoline vehicles by the mid-2020s, further accelerating the shift towards EVs[1].

While the shift to EVs now appears inevitable, the effect that the shift will have on near-to-medium term gasoline sales is unclear. Of the 280 million light duty vehicles on U.S. roads, fewer than 2 million are EVs. Only about 6% of the entire vehicle fleet turns over every year, signifying that it could take until 2035 or later for the majority of vehicles on U.S. roads to be electric, unless "cash for clunker" style policies begin to take more gas cars off the road.

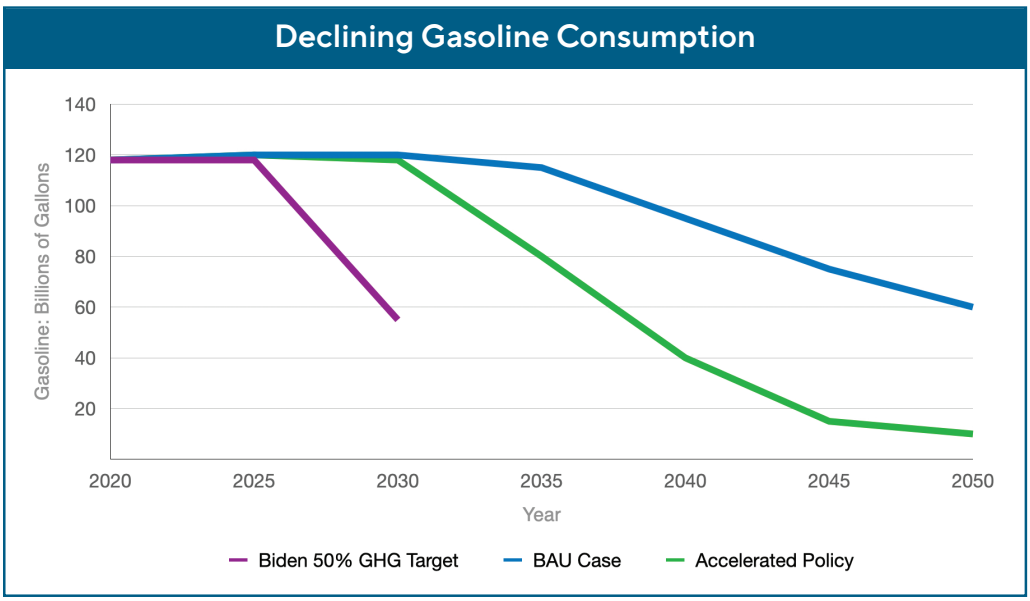


Figure 1: *The blue line is a business-as-usual estimate with EV policy support remaining at traditional levels. The green line shows a decline in gasoline consumption caused by strong EV policy support and strong consumer demand for EVs. Here, gasoline consumption begins a sharp decline beginning in about 2027, falling by half in 2035 relative to 2020, and to almost nothing by 2045. The purple line shows gasoline consumption falling consistent with President Biden's 2030 greenhouse gas reduction target to cut carbon emissions 50% by 2030.[2] (Note: The Biden Climate Plan does not specify what percentage of emissions cuts come from gasoline. The purple line assumes that the cuts in gasoline-related emissions are consistent with overall emissions cuts.)*

Consolidation of Gasoline Retailing

The challenge to gas stations isn't only stemming from EVs. Large retailers such as Costco and Kroger are rapidly building very large 25+ pump gas stations in many parts of the country. These retailers can underprice smaller gas stations by 10% or more and can sell as much as 20 million gallons a year, or 20 times as much as traditional gas stations. Consolidation of smaller and independent gas stations into chains of 50 or more retailers is also underway. These trends will likely increasingly squeeze the margins of independent gas stations.

Aging of Underground Storage Tanks

Meanwhile, there is a ticking time bomb in the ground. It is now about 30 years on from the wave of UST replacements that occurred in the late 1980s and early 1990s. The average tank in the U.S. is more than 25 years of age and nearing the end of its warranty (typically 25-30 years). Many private insurers refuse to insure tanks older than 25 years or require much higher premiums and deductibles. According to Lockton, a leading insurance broker for USTs, "the [insurance] industry views the average useful life span of tanks between 26 and 30 years. Depending on soil conditions, the useful life may be shorter or longer, but it is known that as the tank ages, the likelihood the system is leaking grows exponentially." [3]

Many gas station owners and operators are facing higher operational, maintenance, and inspection costs due to new regulatory requirements and unanticipated equipment degradation. Figure 2 shows percentages of UST tanks by age in nine U.S. states, indicating that 20% of USTs exceeded 30 years of age in 2015.

The extent of the liabilities for UST funds in connection with aging tanks usually remains unknown and unbooked until there is a sale, financing, or change of use for the gas station triggering a phase 2 assessment. When gas stations start going out of business, many more environmental liabilities may surface as former gas station sites change hands.

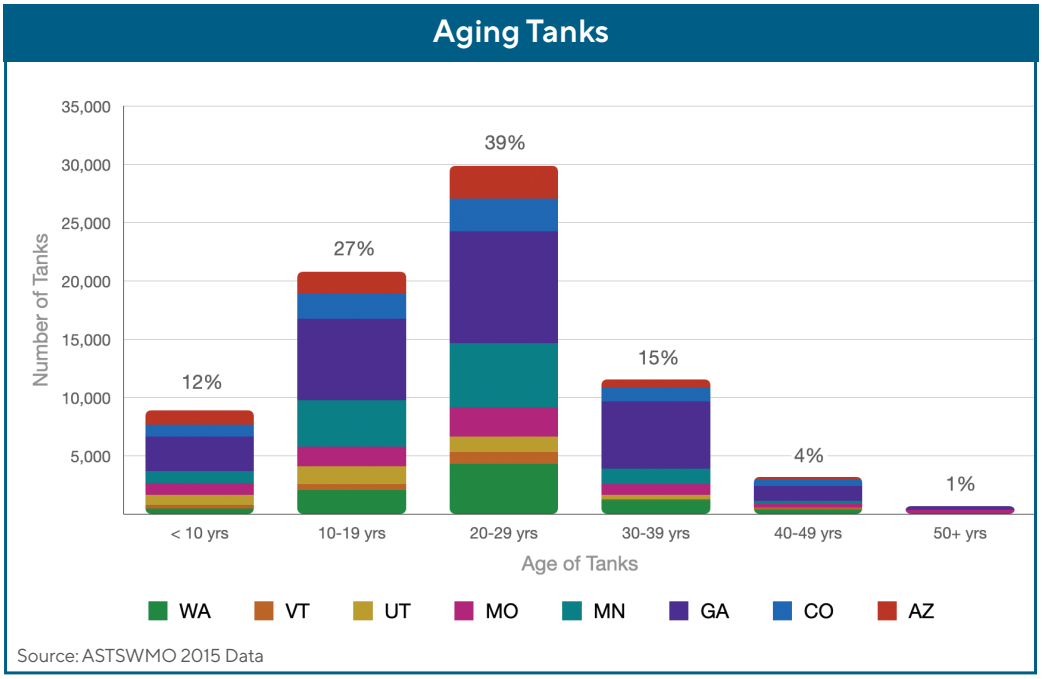


Figure 2: *Percentage of UST tanks by age.*

Increased Regulatory and Political Pressures on Gasoline Retailing

Gas stations are coming under increased political pressure from climate and environmental activists.[4] Gasoline is the single leading source of CO2 emissions in the U.S., and people are increasingly concerned about the health and climate impacts of gas stations.

Environmental justice advocates are taking a hard look at gas stations, which are more likely to be located in Black communities. Leaking tanks have also been found to be more prevalent in Black communities.[5] Regulators should expect increasing pressure from Black and brown communities [6] to clean up older gas stations. They should also expect less tolerance of gas station pollution, especially as the powerful health effects of gas station pollution become more widely known.[7]

The Future of Gas Stations

These trends add up to a bleak future for most gas stations, particularly independently owned stations with older tanks and those selling smaller volumes of gasoline. Sales volumes will likely decline with gathering speed as EVs take increasing market share while margins are increasingly squeezed by larger players. Boston Consulting Group has forecast that as many as 80% of gas stations could be unprofitable by 2035.[8] Meanwhile, gas stations are faced with imminent large investments in new USTs and the cleanups that often occur when the USTs are replaced. With the long-term revenue forecast for gas stations increasingly murky, lender financing for new USTs and cleanups is very much in doubt.

> Gasoline is the single leading source of CO2 emissions in the U.S., and people are increasingly concerned about the health and climate impacts of gas stations.

The number of gas stations in the U.S. has declined by about 20% in the last 20 years. Half of the brownfields in the U.S. are impacted by petroleum, a substantial share of which are shuttered gas stations. [9]

UST Funds in the EV Era

Just as a drop in gasoline sales will cause

major revenue shortfalls for UST funds, a wave of gas station closures is likely to trigger expensive cleanup demands. This trend will likely begin accelerating in the mid-to-late 2020s and speed up from there as older stations face declining sales and lower margins and close their tanks. Some states experienced this on a small scale with COVID-19, when gas sales were down, and some stations went out of business. The difference with the EV takeover is that sales will never bounce back, but rather continue an ever-steeper path of decline.

Unless swift action is taken, USTs fund managers will face a huge increase in claims driven by gas station bankruptcies and demands to clean up long-neglected gas stations, especially in communities of color. Meanwhile, elected officials may be reluctant to raise gas taxes to pay for the skyrocketing costs because of political sensitivities around fuel tax increases. [10]

Preparing for the Change

Regulators and fund managers need to evaluate their programs in light of the rise of EVs, industry consolidation, the aging of USTs, and increased regulatory and political pressure around gas stations.

For example, how would a tank fund handle a scenario where fund revenue declines by 2% a year, and fund costs driven by closing gas stations rise by 10% a year starting in 2025?

Key stakeholders such as affected government agencies, gas station owners, environmental groups, and elected officials should be brought to the table now to understand where EVs and tank insurance finance are headed, and to participate in planning for and implementing a smooth phaseout of gasoline sales. These steps will likely involve increasing revenue to the fund and eliminating the oldest, highest-risk USTs from fund coverage.

Matthew Metz is the founder and co-executive director of Coltura. Reach him at matthew@coltura.org.

ENDNOTES

1 See e.g., Jasper Jolly, Electric cars 'as cheap to manufacture' as regular models by 2024, The Guardian, October 21, 2020, https://www.theguardian.com/environment/2020/oct/21/electric-cars-as-cheap-to-manufacture-as-regular-models-by-2024

2 The White House, Fact Sheet: President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-Paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies, https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-president-biden-sets-2030-greenhouse-gas-pollution-reduction-target-aimed-at-creating-good-paying-union-jobs-and-securing-u-s-leadership-on-clean-energy-technologies/

3 https://www.lockton.com/whitepapers/Underground_Storage_Tanks.pdf

4 See e.g. Bill McKibben, "Do We Actually Need More Gas Stations," The New Yorker, March 24, 2021, https://www.newyorker.com/news/annals-of-a-warming-planet/do-we-actually-need-more-gas-stations; Carrington J. Tatum, "Prospect Park residents take fight with gas station developer public"

MLK 50, November 13, 2020, https://mlk50.com/2020/11/13/prospect-park-residents-take-fight-with-gas-station-developer-public/

5 Andre Perry et al., Metropolitan Policy Program at Brookings & Gallup, The Devaluation of Assets in Black Neighborhoods: The Case of Residential Property 4 (2018), https://www.brookings.edu/wp-content/uploads/2018/11/2018.11_Brookings-Metro_Devaluation-Assets-Black-Neighborhoods_final.pdf

6 Sacoby Wilson et al., Leaking Underground Storage Tanks and Environmental Injustice: Is There a Hidden and Unequal Threat to Public Health in South Carolina?, 6 Env't Just. 175 (2013), available at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3980862/

7 See e.g., Marcus, Michelle. "Going beneath the surface: Petroleum pollution, regulation, and health." *American Economic Journal: Applied Economics* 13, no. 1 (2021): 1-37. ;Metz, Matthew N., and Janelle London. "Governing the Gasoline Spigot: Gas Stations and the Transition away from Gasoline." Envtl. L. Rep. 51 (2021): 10054, available at https://static1.squarespace.com/static/5888d6bad2b857a30238e864/t/5ff87f254b02af23c9d904b8/1610121062028/Governing+the+gasoline+spigot.pdf

8 https://www.bcg.com/publications/2019/service-stations-future

9 https://www.epa.gov/ust/petroleum-brownfields

10 The federal gas tax hasn't been raised since 1993 despite fund shortfalls, an indication of the political challenges associated with raising fuel taxes. *See e.g.* Institute of Taxation and Economic Policy, "It's Been 10,000 Days Since the Federal Government Raised the Gas Tax," February 21, 2021; Available at https://itep.org/its-been-10000-days-since-the-federal-government-raised-the-gas-tax/

from page 7

effort can help in the standardization of UST equipment descriptions. Building on V1, the tool is designed to contribute to preventing leaks and assisting in cleanups (Figure 4). Ultimately, this tool will enhance communication and decision-making among federal, state, tribal and local personnel for routine and emergency response operations at UST facilities.

Additional information on UST Finder can be found on OUST's website, at https://www.epa.gov/ust/ust-finder. This includes a quick start guide, user's manual, instructional videos, fact sheet, and a webinar. Questions can be directed to: hall.alexander@epa.gov.

Fran Kremer and Alex Hall work for the U.S. EPA Office of Research and Development.

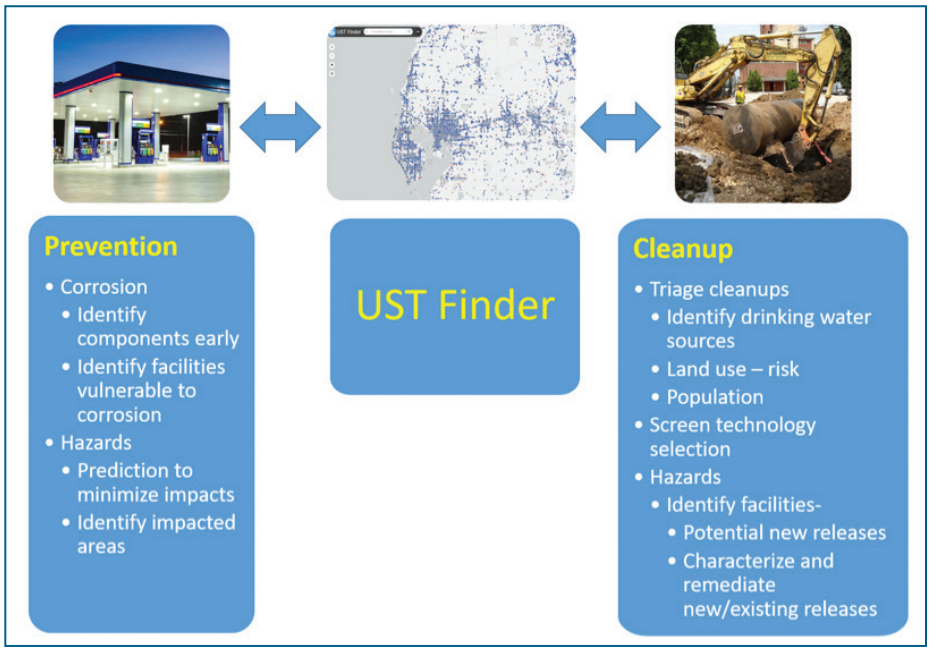


Figure 4 *Cross program utility of UST Finder*

A Message from Mark Barolo

Acting Director, U.S. EPA's Office of Underground Storage Tanks

Emerging Fuels and Compatibility with Underground Storage Tank Systems

As you know, E15 is gasoline blended with up to 15% ethanol, and ethanol is made from corn and other plant materials. In developing this article for "LUSTLine" regarding compatibility of underground storage tank (UST) systems with petroleum products containing ethanol, I learned some interesting facts about corn.

In the United States, corn is grown on approximately 97 million acres of land—roughly the size of California—and produced primarily in our country's heartland region. Corn is a highly productive crop and yields between 140 to 160 bushels per acre. Corn can be used for food as corn flour, cornmeal, hominy, grits, or sweet corn. It can be used as animal feed to help fatten hogs, chickens, and cattle. And it can be turned into high-fructose corn syrup, bio-based plastics, or of course, ethanol.

More applicable to the UST program, approximately 40 percent of corn grown in the United States is used for ethanol. This is a growing segment of the corn industry and may lead to more ethanol being stored in USTs.

Below I discuss the federal UST regulation and compatibility, U.S. EPA's January 2021 proposed rule about storing E15 in USTs, and a few miscellaneous emerging fuels updates.

The Federal UST Regulation and Compatibility

Fuels that are stored in tanks have evolved over many decades. Gasoline used to be commonly blended with methyl tertiary-butyl ether, or MTBE, but that was phased out for environmental reasons, and ethanol has taken its place. Limited use of ethanol started in some parts of the United States in the late 1970s, with nationwide ethanol use beginning in the mid-2000s. As fuels and additives have evolved over the last century and continue to do so in the coming years, we, too, will adapt and ensure compatibility of underground tank systems storing those fuels.

The 1988 federal UST regulation required that UST owners and operators ensure their systems are compatible with substances stored in the system. The compatibility requirement applies to gasoline with ethanol, and all regulated substances. In the 2015 federal UST regulation, U.S. EPA confirmed the requirement for compatibility and required additional notification, demonstration, and record-keeping actions of owners wishing to store some fuel blends, like those with higher percentages of ethanol and biodiesel. U.S. EPA's federal UST regulation ensures new fuels work safely with the existing infrastructure and helps to prevent releases.

Meeting the compatibility requirement is integral to preventing UST releases, and preventing releases protects our soil and groundwater, which is the source of drinking water for nearly half of the people living in the United States.

As of March 2021, U.S. EPA regulates approximately 540,000 petroleum underground storage tank systems at about 193,700 facilities, and those facilities store a variety of different fuels and regulated substances. Since the inception of the national UST program, states, territories, and the District of Columbia (collectively referred to as states) have confirmed over 562,000 UST releases. Over the last 10 years, the number of releases has stabilized, with states reporting approximately 58,000 releases between 2011 and 2020. Compared to the number of releases reported in previous years, we see that U.S. EPA and our partners' prevention work is doing what it is supposed to do: helping to keep petroleum from contaminating the environment. Ensuring UST system compatibility plays an essential part in that prevention work.

U.S. EPA's January 2021 Proposed Rule Includes Storing E15 In Underground Storage Tanks

E15 is a relatively new fuel blend. Five years ago, very few fueling stations sold E15. But U.S. EPA's June 2019 "Modifications to Fuel Regulations to Provide Flexibility for E15; Modifications to RFS RIN Market Regulations" removed some barriers to year-round use of E15, and it is now available for purchase at a few thousand stations nationwide. U.S. EPA expects station owners will continue to show interest in offering E15.

The environmentally safe growth of E15 markets depends on owners and operators storing E15 and dispensing it from UST systems that are compatible with the substance stored. Storing and dispensing E15 at fueling stations with equipment that is incompatible with higher blends of ethanol fuel can result in leaks and releases that contaminate our land and groundwater. Most existing UST systems—including but not limited to tanks, pumps, ancillary equipment, lines, gaskets, and sealants—are not fully compatible with E15; those UST systems must be modified before storing E15. For example, the tank portion of an UST system is often compatible with E15, but some of the connectors and pump components

A Message from Mark Barolo... continued

may not be, and that incompatibility can lead to leaks.

Demonstrating compatibility for existing UST equipment can sometimes be difficult. Documents and information about what specific equipment was buried underground at a fueling station long ago is often unavailable. Because interest in storing E15 and other biofuels may continue to grow, U.S. EPA, in the January 19 Federal Register, published a proposed rule about E15 fuel dispenser labeling and compatibility with underground storage tanks; see www.epa.gov/ust/proposed-rulemaking-e15-fuel-dispenser-labeling-and-compatibility-underground-storage-tanks.

The UST portion of the proposed rule requested comments on proposed revisions to the 2015 UST regulation:

- Granting certain allowances for owners and operators in demonstrating compatibility, which would make it easier for them to meet the current requirements.
- Establishing a new requirement for future UST system installations or UST equipment and components replacements to be constructed with equipment and components compatible with ethanol blends up to 100 percent. EPA proposed that this requirement would apply to any repairs or replacements to UST systems beginning one year after publication in the Federal Register.
- Changing the 2015 state program approval (SPA) regulation and making it consistent with proposed revisions described in the bullet above.

As a reminder, if U.S. EPA publishes a final rule, the changes will go into effect in states without SPA and in Indian Country. Other SPA states and territories will have three years from the date of the final rule to revise their regulations as part of their state program approval.

U.S. EPA accepted comments on the proposed rule through April 19, 2021. I sincerely thank all of you who provided comments on the proposed rule; input and information from our UST partners are critical to helping us make a fully informed decision going forward. U.S. EPA is reviewing and considering all the comments we received. As soon as I am able, I will share additional information and updates with you.

> Ethanol has been known as a potential fuel source since around the invention of automobiles. Today, gasoline blended with 10 percent ethanol is offered at almost every fueling station in the country.

Miscellaneous Emerging Fuels Updates

In July 2020, we updated our booklet, "UST System Compatibility with Biofuels;" see www.epa.gov/ust/ust-system-compatibility-biofuels. This version includes new information for implementing the 2015 UST regulation; technical updates based on changes in the fuels market; and updated compliance assistance forms to help regulators, owners, and operators determine the compatibility of UST systems to store biofuels.

In addition, U.S. EPA's UST emerging fuels web area at www.epa.gov/ust/emerging-fuels-and-underground-storage-tanks-usts is a great resource if you are looking for more details about emerging fuels. It provides information about safely storing all types of emerging fuels and numerous resources related to corrosion in UST systems, especially related to problems in diesel fuel UST systems.

Finally, I thought you would be interested to hear about the U.S. Department of Agriculture's (USDA) grant program to significantly increase the sales and use of higher blends of ethanol and biodiesel. In 2020, USDA announced its Higher Blends Infrastructure Investment Partnership (HBIIP) program, and over the last year awarded grants to fueling and fueling distribution facilities for equipment upgrades. In total, USDA will award approximately $100 million, setting aside nearly $90 million for ethanol systems. Grant recipients will use the money to convert their facilities through upgrade or installation of equipment required to ensure all equipment is fully compatible with higher blends of ethanol and biodiesel. EPA collaborated with USDA during the grant program design and successfully ensured they understood compatibility requirements for UST systems. As a result, the HBIIP grant program includes all UST system components as eligible equipment to receive money for upgrades; it is not limited to fuel tanks and fuel dispensers.

In the emerging fuels world, we like to say that "everything is fluid," because fuels and UST technology both continue to change. Fortunately, the federal UST regulation provides the foundation for U.S. EPA, states, tribes, the petroleum equipment and service industry, and our regulated community to continue our 30-plus-year tradition of working together successfully to protect our country's land, groundwater, and human health. Even though we are uncertain what will ultimately come of the E15 proposed rule, we are committed to working cooperatively with all our UST stakeholders as we together navigate the changes and challenges of the next decades in the fuels and transportation industry.

Tank-nically Speaking

by Marcel Moreau

Is Your ATG at Risk for Alzheimer's?...or Why Older ATGs Have a Backup Battery

Many automatic tank gauges (ATGs) still in service today were originally designed in the early 1990s. For those of you who can't recall that far back, those were the days when stacks of floppy disks stored your computer data, people used phones with long dangly cords that didn't have an "i" in front of their name, and cameras had rolls of film in them and were used mostly to take pictures of other people. That ATGs with such stone age (by today's standards) technology continue to function is a testament to the hardiness of their components and design.

But that ancient ATG technology included a few idiosyncrasies that we don't even think about today. We unplug thumb drives with nary a thought that the data we have just recorded there will be lost. Back in the day when early model ATGs were conceived, disconnecting them from a power source would have resulted in the immediate loss of their site-specific memory. Which brings me to the topic for this article: ATG backup batteries.

Let's Start With the 2015 Amendments to the UST Rule

The 2015 amendments to the UST rule added requirements for the operation and maintenance of leak detection equipment. ATGs play a prominent role in leak detection at a great many UST facilities. The 2015 amendments contain some very specific guidance on what must be checked during the annual inspection of the ATG console: "...test alarm; verify system configuration; test battery backup" (40 CFR 280.40(a)(3)(i)). The rule contains additional ATG inspection items such as checking probes and sensors, but in this article, I want to explore the backup battery test specified in the rule for the ATG console.

What Does an ATG Backup Battery do?

Let's start with what the backup battery does NOT do. Neither the preamble nor the 2015 rule provides any information about what exactly an ATG backup battery is or what it does. Given the important role that ATGs play in leak detection, a regulator could be forgiven for thinking that the role of the backup battery is to keep the ATG fully functional during a power outage. That is, the ATG would continue to provide fuel level readings, run 0.2 gph leak detection tests, monitor sensors in sumps, and sound alarms if the ATG detected any worrisome condition. But, alas, this is not the case. There is no ATG that I know of that is equipped with a battery backup system to keep the ATG fully operational during a power outage at the facility where it is installed.

To understand the function of the backup battery in ATGs of a certain age, we need to delve a little bit into the history of computer memory. Today's thumb drive and flash card data storage devices can store huge amounts of data in a very small package quite inexpensively. We take for granted that we can unplug a thumb drive, set it aside for days or weeks, or even years and still have all our data intact the next time we plug it in. This has not always been the case.

Back in the early 1990s, when ATG technology was first emerging, certain types of data storage were more impermanent. If the electric current to a memory device were interrupted, all the stored data would be lost. This was known as "volatile" memory.

Older ATGs with this type of volatile memory that is lost when the power supply is interrupted come equipped with a backup battery. The battery serves as a backup power supply to the ATG's memory circuits so that the information contained is not lost should the power to the device be interrupted. The information stored in this volatile memory is typically the site-specific information such as the size and content of tanks, alarm settings, and when to run leak tests. In the absence of a backup battery, the site-specific information stored in the ATG would need to be re-entered every time there was even a brief power outage at the facility or if the power supply to the ATG were interrupted.

The amount of electrical current required to preserve an ATG's memory

is very small. Backup batteries in ATGs are typically the coin-sized batteries found in many types of electronic equipment today.

Do all ATGs Have Backup Batteries?

No! The nature of computer memory has changed dramatically since the 1990s, so more recent models of ATGs incorporate non-volatile memory and do not need backup batteries. The testing of backup batteries is a procedure specific to certain older ATG models.

Which ATGs Have Backup Batteries?

Backup batteries are likely present in older ATGs that were designed in the early to mid-1990s. Most ATGs of that vintage are no longer in production and it seems likely that only a few remain in service. The exceptions are the venerable Veeder-Root TLS 350 which is still in widespread use and the INCON TS-1000, which was popular at the time and some of which have survived into the present. Remember, too, that Gilbarco ATGs were just Veeder-Root ATGs with a different paint job on the console.

Note that I mention brand names to provide some concrete examples of the ATGs that are the topic of this article. Mentioning brand names does NOT imply endorsement of these devices by the U.S. EPA, NEIWPCC, or myself.

> The battery serves as a backup power supply to the ATG's memory circuits so that the information contained is not lost should the power to the device be interrupted.

How do You Tell if an ATG has a Backup Battery?

ATG installation or operator manuals for specific ATGs are a good place to look for information about whether an ATG contains a backup battery. The operator manual for the Veeder Root TLS 350 is still readily available online. Manuals for other ATGs produced in the 1990s may exist online, but after an admittedly limited search, I was not able to locate them. If you are feeling ambitious and want to pursue the search for early ATG manuals, reach out and let me know what you find.

The Veeder-Root TLS 350 is the most common ATG containing a backup battery that is still routinely found at UST facilities. For this reason, the following discussion is based on the TLS 350.

Do Backup Batteries Fail?

The backup battery in an ATG is designed to last for a long time. But, as we all probably know from personal experience, batteries do not last forever. Folks in the ATG monitoring business tell me that they would expect about one in two hundred ATGs to fail a backup battery test.

How do You Tell if a Backup Battery is on?

The factory setting for a TLS 350 backup battery is set to "off" and it must be switched on via an internal switch during the initial set up. If the battery is not turned on, this will be indicated on the display. You will see a "battery backup is off" message rather than the usual "all functions normal" message. I don't believe that having the backup battery turned off is a common problem, at least for the Veeder-Root TLS 350.

How do You Test the Backup Battery in a Veeder-Root TLS 350?

The Veeder Root TLS 350 operator manual has, for many years, included a maintenance checklist that includes a check of the backup battery. The Veeder Root procedure specifies that you print a copy of the setup parameters stored in the ATG as a first step. You'll see why this is important in a minute.

The operation of the battery is tested by cutting power to the TLS 350 console via the circuit breaker in the facility electrical panel. This is like flipping a switch to turn off the power to the ATG. When you turn the power back on, if the site-specific data is still present in the ATG, then the backup battery has passed the test. If the site-specific data are no longer present, the battery has failed the test.

This is certainly a simple test, but the downside is that if the battery has failed, then you must reprogram the console with all the site-specific information. This could be a pain if you have to reenter this information via the buttons on the console itself. This is also why it is important to print or record the setup information immediately before cutting the power to the console.

The upside of the test is that there is a technician onsite who hopefully has a replacement battery handy and can immediately reconfigure the ATG to function as before.

Can I Check the Condition of the Backup Battery Before I Turn off the Power to the ATG?

Good question! And it turns out you can. The 2015 edition of the Veeder Root Troubleshooting Guide includes a procedure for measuring the voltage of the backup battery while the power to the ATG console is on. If the battery voltage is up to snuff, you can perform the operability test described above and be confident that the battery will pass the test. If the battery voltage is too low, you can replace the battery without losing the site-specific memory (remember the power to the console is still on). You would then perform the operability test described above with confidence that the ATG site specific memory will remain intact. (Many thanks to Alicia Meadows of the Virginia DEQ who pointed me to this procedure in the TLS-350 Troubleshooting Guide.)

Does the Backup Battery Have to Be Tested if One is Present?

The 2015 federal rule specifically calls for a test of the backup battery as part of the annual ATG inspection. The federal rule also states that Petroleum Equipment Institute (PEI) RP 1200, "Recommended Practices for the Testing and Verification of Spill, Overfill, Leak Detection and Secondary Containment Equipment at UST Facilities," can be used to comply with the required annual inspection of leak detection equipment. At present, RP 1200 makes

no mention of testing ATG backup batteries.

It had been my understanding that if a technician followed RP 1200 completely, then the testing of the backup battery would not be required because it was not included in RP 1200. However, the folks at U.S. EPA tell me that this is NOT the case. If a code of practice fails to mention an inspection procedure that is included in the federal rule, the procedure must still be conducted if it is applicable to the ATG.

In other words, just because a code of practice does not include an equipment test described in the federal rule does not permit owners and operators to skip the test. The bottom line is that owners and operators must make sure that ALL the equipment tests described in the rule for each UST component are completed each year.

For a more complete explanation of UST component testing requirements, refer to the preamble of the 2015 UST rule amendments published in the Federal Register for Wednesday, July 15, 2015, page 41582.

What if the ATG is not a TLS 350?

How do you test a backup battery in an ATG that is not a Veeder-Root TLS 350? Let's recall that in the federal rule, the procedure for conducting a required test can be determined in one of three ways:

- Following the equipment manufacturer's instructions.
- Following a code of practice developed by a nationally recognized association or independent testing laboratory.
- Following requirements determined by the implementing agency to be no less protective of human health and the environment than the two options listed above.

Because of the absence of a backup battery test procedure in RP 1200, the procedure for testing backup batteries would need to be provided by the ATG manufacturer or the implementing agency. For older ATGs, it is likely that the operator manual (if one can be found) does not include any maintenance or test procedures. If there are no manufacturer procedures and no code of practice that addresses a procedure, then it would be up to the implementing agency to describe or approve a backup battery testing procedure.

Folks at PEI tell me that comments regarding the absence of a backup battery testing procedure in RP 1200 have been received and the topic will be considered by the committee responsible for RP 1200 the next time the Recommended Practice is up for review in 2024.

> The 2015 federal rule specifically calls out a test of the backup battery as an element of the annual ATG inspection.

What's Your Question?

The seed for this article was planted by a state regulator who asked how ATG backup batteries were tested. If any UST related questions have been bugging you, drop me a line at marcel.moreau@juno.com .

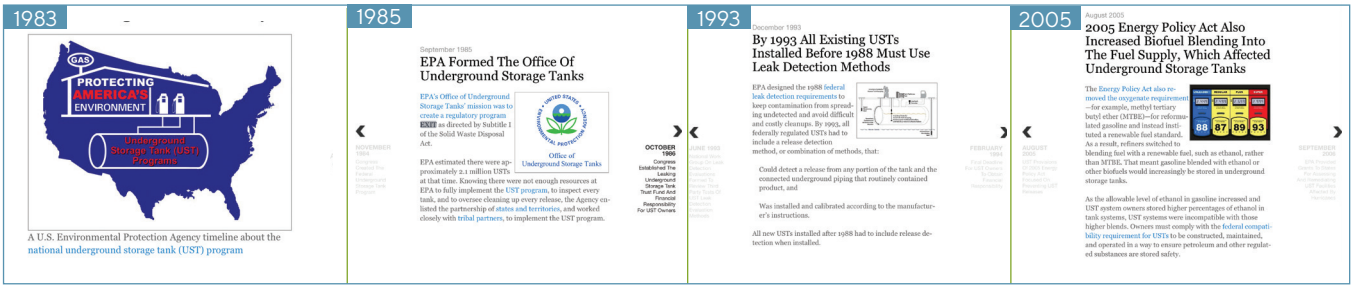
Marcel Moreau is a nationally recognized petroleum storage specialist whose column, Tank-nically Speaking, is a regular feature of "LUSTLine."

UST PROGRAM TIMELINE

U.S. EPA developed a timeline about the national underground storage tanks (UST) program; see www.epa.gov/ust/milestones-underground-storage-tank-programs-history. The timeline provides an easy-to-use and succinct history about the national UST program. It describes milestones in the national UST program since its inception through today and recognizes the incredible body of underground storage tank work completed to date.

The timeline covers the origin of the UST program; significant events through the program's history, such as legislation, regulations, and technology developments; partnerships with states, territories, tribes, and industry; highlights of the UST program's work in preventing releases, detecting leaks, and cleaning up releases; and the importance of ensuring all communities, including those shouldering a disproportionate share of exposure to negative effects of pollution, are protected from UST contamination.

Milestones* In The Underground Storage Tank Program's History



* This is an example image only. The complete timeline is available online.

FAQS from the NWGLDE

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

In this FAQs from the National Work Group on Leak Detection Evaluations (NWGLDE) we discuss revision to the 1988 protocols including statistical inventory reconciliation, automatic tank gauging, tank tightness testing and pipeline release detection methods.

Note: The views expressed in this column represent those of the work group and not necessarily those of any implementing agency.

In May 2019 U.S. EPA released new standard test procedures for evaluating release detection methods (protocols). These protocols were released in response to the 2015 UST revisions to 40 CFR 280 and 281, and revised the protocols from 1990. These protocols are used by vendors and their third-party evaluators to determine whether their leak detection methods meet the requirements of 40 CFR 280 and 281.

Q. What revisions were made to the protocols?

A. The following is a list of the protocols that were updated, as well as a few examples of changes that were made:

Statistical Inventory Reconciliation (SIR)

The 1988 regulations allowed qualitative SIR methods. Qualitative methods simply state a result of "pass" or "fail" without providing an indication of the calculated leak rate associated with the data. However, when the regulations were updated in 2015, qualitative SIR methods were no longer allowed. The procedures had to be updated to reflect this change. Data from physical leak simulations are required to be used, inconclusive results are not acceptable, and the data processing by SIR methods are to be blind to the vendor.

Automatic Tank Gauging (ATG)

The revised protocols included revised water sensor test methods for ethanol blended fuels, evaluations of syphoned tanks, and changes to temperature differentials for testing parameters from ±5°F to ±10°F.

Tank Tightness Testing (TTT)

Prior to 2019, there were two separate TTT protocol documents. One for volumetric TTT and one for non-volumetric TTT. In 2019, these protocols were combined into one document. The new protocol addresses water table effects on leak rates and whether water table effects could interfere with the testing.

Pipeline Release Detection Methods

The options for testing were reduced from five to two options. Bulk piping such as the size used in airport hydrant systems, can now be incorporated into the test designs. Compressibility of the piping material can now be addressed in the piping limitations. Temperature differentials for testing parameters was changed from ±5°F to ±10°F.

Q. How do these changes affect the National Work Group on Leak Detection Evaluations (NWGLDE), third party evaluators, and leak detection equipment vendors?

A. Once a leak detection method has been evaluated by a third party, utilizing these protocols, the leak detection method owner can submit the results to NWGLDE for evaluation. If NWGLDE determines the third-party evaluator followed the appropriate protocol and the results meet NWGLDE criteria, NWGLDE adds the leak detection method to its list for that type of leak detection method.

In response to the new protocols, the NWGLDE has had to change its evaluation criteria to reflect the new protocols. Leak detection methods that were evaluated using U.S. EPA's original 1990 protocols or protocols previously deemed equivalent to the 1990 protocols, are still listed on the NWGLDE website. However, due to the new changes to the protocols, and to the NWGLDE evaluation criteria; as of January 1, 2021, NWGLDE will no longer review evaluations of leak detection methods conducted by a third party utilizing the 1990 protocols.

About the NWGLDE

The NWGLDE is an independent work group comprising 11 members, including 10 state and 1 U.S. EPA 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 them 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.
- Ensure that the leak detection system meets U.S. EPA and/or other applicable regulatory performance standards, if applicable.
- 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 EPA standard test procedures.
- Make the results of such reviews available to interested parties.

NEIWPCC

NEWS & RESOURCES

Training Webinars

NEIWPCC continues to work with our state, territorial and tribal partners, and other stakeholders to plan and provide training webinars related to UST compliance and LUST cleanup. We continue to finalize plans for webinars in summer and fall of this year, and we expect to cover:

- Safety and Design of USTs at Marinas.
- Emergency Power Generator UST Systems.
- Innovative Approaches to LUST Cleanup.
- High Resolution Site Characterization at LUST Sites.
- Other topics to be determined.

Details, dates, and links to previous webinar trainings are available at NEIWPCC's website.

From Mark Barolo, Acting Director, U.S. EPA Office of Underground Storage Tanks

Congratulations to NEIWPCC for hosting 10 years of UST inspector training webinars, as of the end of 2020. We convey a sincere thank you for your excellent support and service to the UST community.

Since hosting the first webinar in 2010, NEIWPCC has continued to produce high quality, informative webinars that are an extremely valuable training resource for the UST community. NEIWPCC's webinar series gained enormous participation and continues to provide excellent speakers representing regulators, industry, and other luminaries in the UST arena. We look forward to the next 10 years and beyond.

New Workgroup

NEIWPCC established a Tribal UST/LUST workgroup earlier in the year to network with professionals working on UST and LUST issues within Indian Country. The group meets on a recurring basis to discuss UST/LUST-related training and information-exchange opportunities for workgroup participants and tribal stakeholders. If you work on UST/LUST issues on behalf a tribe and are interested in learning more about this workgroup, please let us know!

National Tanks Conference

In case you missed our announcement, the 27th National Tanks Conference (NTC) is now scheduled for September 13-15, 2022, at the Wyndham Grand Hotel in Pittsburgh, Pennsylvania. Pre-conference workshops will be held on September 12. NEIWPCC will be working with our conference co-sponsors at EPA OUST and ASTSWMO to develop a new call for abstracts. Be on the lookout for announcements related to the conference later in the year, and visit the conference website for the most current information:

NTC website: https://neiwpcc.org/our-programs/underground-storage-tanks/national-tanks-conference/

Everything You Wanted to Know About Tanks—Online

Every issue published since 1985 can be accessed via the "LUSTLine" Archive. If you are looking for content on a specific topic, consult the "LUSTLine" Index (https://neiwpcc.org/wp-content/uploads/2021/01/LUSTlineIndex_1-88.pdf). Both downloads are available via the "LUSTLine homepage, https://neiwpcc.org/our-programs/underground-storage-tanks/l-u-s-t-line/ of NEIWPCC's website.

Let's Connect

We invite you to reach out to NEIWPCC with questions, comments, or to be added to our distribution lists. We especially are interested in connecting with potential contributors. If you would like to write an article for a future issue, please contact Drew Youngs (dyoungs@neiwpcc.org). As, always we welcome you to visit our UST/LUST homepage to view related resources, including more information on items discussed here.

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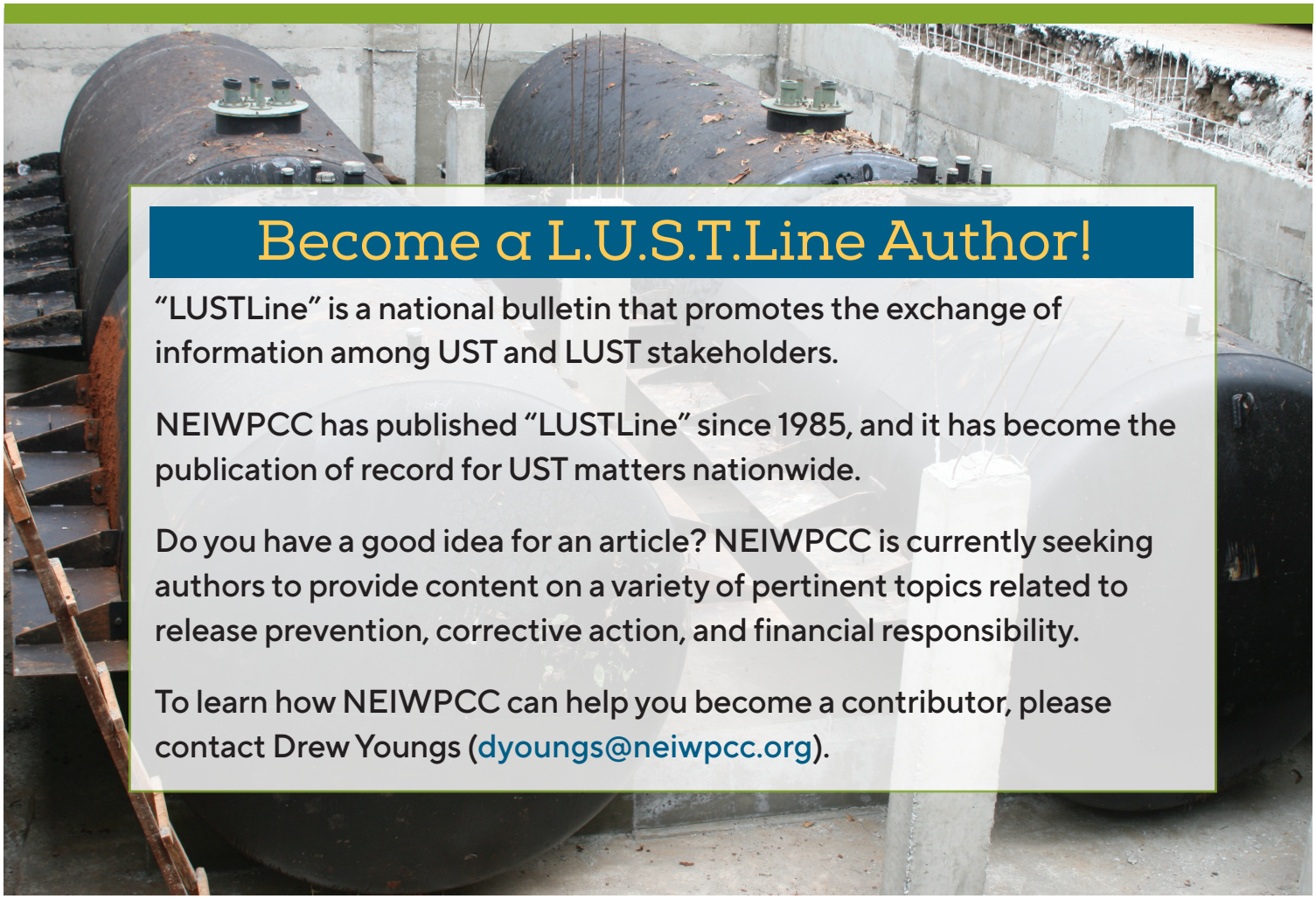

Become a L.U.S.T.Line Author!

"LUSTLine" is a national bulletin that promotes the exchange of information among UST and LUST stakeholders.

NEIWPCC has published "LUSTLine" since 1985, and it has become the publication of record for UST matters nationwide.

Do you have a good idea for an article? NEIWPCC is currently seeking authors to provide content on a variety of pertinent topics related to release prevention, corrective action, and financial responsibility.

To learn how NEIWPCC can help you become a contributor, please contact Drew Youngs (dyoungs@neiwpcc.org).