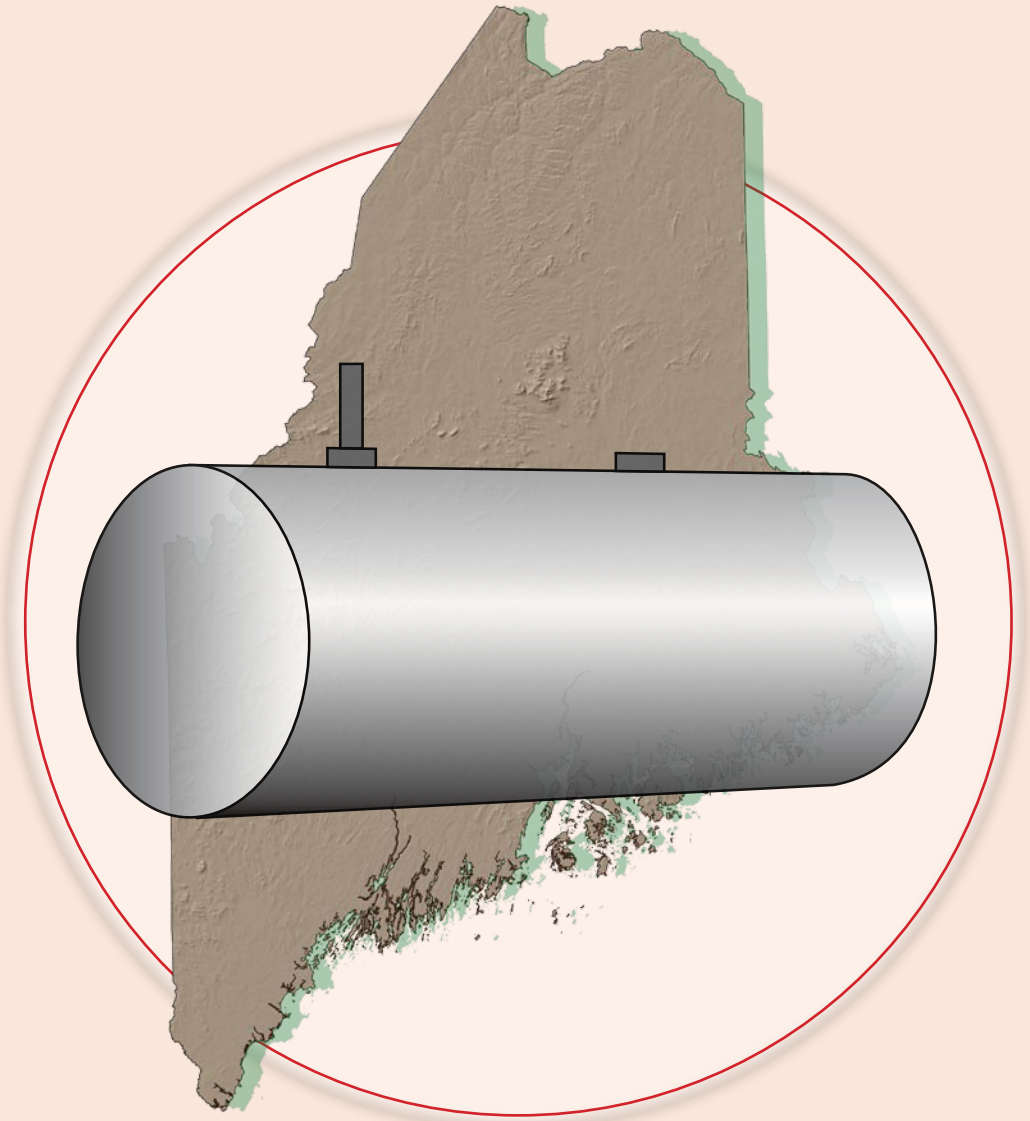
TankSmart



MAINE'S CLASS A/B UST SYSTEM OPERATOR TRAINING MANUAL

Prepared for
Maine Department of Environmental Protection

Produced by
Petroleum Training Solutions
and
Enosis – The Environmental Outreach Group

February 2010

WELCOME TO

TankSmart

MAINE'S CLASS A/B UST SYSTEM OPERATOR TRAINING MANUAL

Enclosed in this packet you will find training modules that are specific to your facility, as well as a current facility REGISTRATION form, which should be posted at your facility. Below is a list of ALL of the *TankSmart* training modules; those with checkmarks next to them are enclosed in this packet. They have been selected based on the information contained in your facility registration and are relevant to your specific facility. Please read the introductory module for more information on how to use these materials to become a tank operator in Maine. If you have questions concerning this training, contact the Underground Tanks Unit at the Maine Department of Environmental Protection during regular business hours at 207-287-2651.

ENCLOSED	MODULE #	MODULE TITLE
		GENERAL
	1	Introduction to Maine's *TankSmart* Class A/B UST System Operator Training
	2	Class A/B Operators
	3	Training Class C Operators
	4	Annual UST System Inspections
	5	Record Keeping
	6	Spills: Cleanup & Reporting
	7	Safety
		TANKS / LEAK DETECTION
	8	Tanks: Double-Walled with Continuous Electronic Monitoring
	9	Tanks: Double-Walled with Manual Monitoring
	10	Tanks: Single-Walled
	11	Daily Inventory & Statistical Inventory Analysis
	12	Automatic Tank Gauges (ATGs)
		PIPING / LEAK DETECTION
	13	Piping: Double-Walled Systems
	14	Piping: Single-Walled Systems
	15	Piping: Pressurized Pumping Systems
	16	Piping: Suction Pumping Systems
		DELIVERIES
	17	Overfill Prevention: Ball Floats
	18	Overfill Prevention: Electronic Alarms
	19	Overfill Prevention: Drop-Tube Shutoff Valves
	20	Spill Buckets
		CORROSION PROTECTION
	21	Cathodic Protection for Tanks & Piping
		MISCELLANEOUS
	22	Stage I Vapor Recovery
	23	Dispensers
	24	Out-of-Service Tanks
	25	Aboveground Storage Tanks (ASTs)
	26	Consumptive Use Heating Oil Tanks & Diesel-Fueled Generator Tanks
	27	Ethanol-Blended Gasoline

DISCLAIMER:

TankSmart is intended to aid UST owners and operators in understanding and implementing Maine's regulatory requirements for underground oil storage tanks. It is not intended to supplement or replace any statutory or regulatory requirements and does not create any enforceable right at law or equity. In the event that any inadvertent conflict between this guide and Maine's statutes and regulations exists, the statutes and regulations shall control.

This training does not constitute Maine DEP policy. Mention of trade names or commercial products does not constitute endorsement or recommendation for use. Links to non-DEP websites do not imply any official DEP endorsement of, or a responsibility for, the opinions, ideas, data, or products presented at those locations or guarantee the accuracy of the information provided.

INTRODUCTION

MAINE'S TankSmart CLASS A/B UST SYSTEM OPERATOR TRAINING MANUAL

Underground oil storage facilities can be sources of leaks and spills that can put the environment and public health at risk from petroleum contamination. A facility that is properly operated and maintained by a knowledgeable person is less likely to have an accidental release of petroleum to the environment.

An underground oil storage facility that is properly operated and maintained by a knowledgeable person is less likely to have an accidental release of petroleum to the environment.

The 2005 Federal Underground Storage Tank Compliance Act requires that each federally regulated underground storage tank (UST) have a properly trained and certified operator by August 8, 2012. However, Maine law required the Department of Environmental Protection (DEP) to develop a program to train owners and operators of federally regulated underground oil storage tanks by August 8, 2009.

The Maine DEP will be proposing rules regarding its operator training program requirements in 2010. The proposal will include deadlines for operators to complete the *TankSmart* training program. When the rule is formally proposed, the proposal will be available for 30 days to provide an opportunity for comments. For more information on Maine's operator training program and rules, call the DEP at 207-287-2651 and ask for someone in the Underground Tanks Unit.

In response to the federal rule, the DEP developed the *TankSmart* program to train persons who operate UST facilities in the state. The program enables facility operators to learn how to properly operate and maintain their equipment in compliance with Maine's Ground Water Protection laws and the DEP's Rules for Underground Oil Storage Facilities. Both online and print versions of *TankSmart* were developed to meet the diverse needs of Class A/B UST operators in Maine. Anyone who wishes to serve as a Class A/B operator must pass Maine DEP's UST Operator Examination.

Class A/B UST operators should know the basics of how their equipment works.

This print version of Maine's *TankSmart* Class A/B UST System Operator Training Manual was developed to:

- **Provide the *TankSmart* training program to operators who do not have access to online training**
- **Provide easily accessible reference material to all UST facility operators**
- **Provide owners and operators with informational materials that can be tailored to their facilities**

Courtesy of Marcel Moreau Associates, Portland Maine.

WHO MUST BE TRAINED AND CERTIFIED?

Each facility in Maine must have a minimum of one certified Class A/B operator and one Class C operator.

The Federal Underground Storage Tank Compliance Act established three categories of UST operators—Class A, B, and C.

Class A Operator – responsible for the overall UST facility, and may manage employees who are responsible for operating and maintaining the facility.

Class B Operator – responsible for operation, maintenance, and record keeping at the UST facility on a day-to-day basis.

Class C Operator – must be trained to know what actions to take in response to a leak alarm or an emergency, such as a spill at the facility.

Maine has combined the responsibilities of the Class A and Class B operators into a single category called Class A/B (see the *TankSmart* Class A/B Operators module). Each facility in Maine must have a minimum of one certified Class A/B operator and one Class C operator. Class A/B operators in Maine may also serve as the Class C operator if they can meet the Class C requirements (see the *TankSmart* Training Class C Operators module).

HOW DOES *TANKSMART* WORK?

TankSmart is a free, Internet- and print-based training service that allows operators of registered oil storage tank facilities in Maine to achieve their Class A/B operator certification.

TankSmart is an Internet- and print-based training service that allows operators of registered oil storage tank facilities in Maine to achieve their Class A/B operator certification. You may obtain individual certifications for specific facilities by taking the modules applicable to each facility. If you want certification to operate any facility, take all of the modules and you will receive certification as a "General Operator."

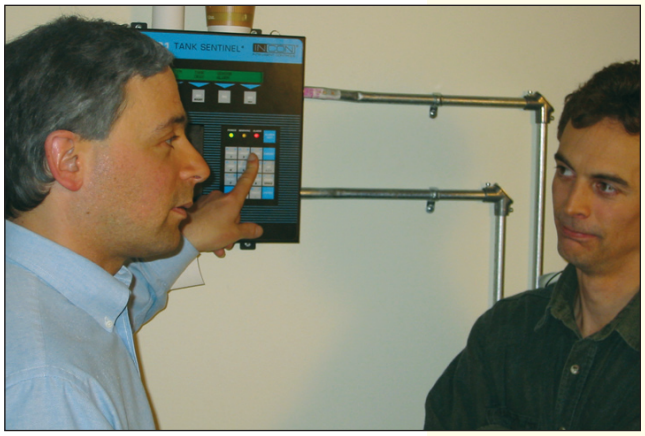
Both the online and print versions of *TankSmart* are organized into 27 individual modules. The modules that apply to your facility will be automatically assigned to you by the online *TankSmart* program, based on the information contained on your facility's registration form.

To obtain a copy of the print version of *TankSmart*, contact the DEP by phone (207-287-2651) or mail (Tanks Unit, 17 State House Station, Augusta, ME 04333), and DEP personnel will provide you with the printed versions of the *TankSmart* modules that apply to the facility or facilities you operate. (The package you receive from the DEP will include a table of contents indicating the modules that apply to you, based on your tank registration information.)

You may take the exam and obtain certification for a specific facility, or for all the facilities for which you are responsible. Anyone can take the training, even if you do not need certification as an UST operator. You can view the training information for as many, or as few, topics as you wish; however, it is important that you review at least the *TankSmart* modules applicable to your facility.

Once you have studied either the online or the print version of *TankSmart* and feel you are ready, you should go online to take the test. If you do not have Internet access, you may be able to access the Internet at a local library. If you are having problems accessing the online exam, call the Underground Tanks Unit at 207-287-2651 for assistance. After passing the exam, you will be able to print a certificate to show that you are an official UST operator in Maine.

Your *TankSmart* Class A/B certification must be renewed annually, which means you must take the exam over again each year.



Courtesy of Marcel Moreau Associates, Portland Maine.

An UST operator should know how to properly respond to alarms.

NOTE: Although the *TankSmart* program is designed for operators of underground oil storage facilities, the *TankSmart* Operator Certification Program is available to anyone free of charge.

What You Will Need

In order to use the online facility training and operator certification service, users will need to log in with the following information:

- Facility registration number (not applicable for General Operators who wish to be able to operate any facility)
- Your legal name

Your computer must have the free Adobe Reader software required to view/print registration certificate.

Your TankSmart Class A/B certification must be renewed annually, which means you must take the exam over again each year.

To access the online version of *TankSmart*, go to:

www.maine.gov/dep/rwm/ust/tanksmartonlineservice.htm

Click on

TankSmart the Oil Storage Tank Search & Operator Training Online Service

You may also download and print the complete print version of *TankSmart* from this Internet site.

Click on
TankSmart in Print

To start the print version of TankSmart, simply turn the page.

CLASS A/B OPERATORS

Underground storage tank (UST) systems can be sources of leaks and spills, which put the environment and public health at risk from petroleum discharges. A recurring complaint of regulators across the United States has been that UST operators do not understand their storage systems, especially the leak detection equipment. An UST system that is operated and maintained by a knowledgeable person is less likely to have petroleum releases or spills to the environment. A knowledgeable person is more likely to identify and respond appropriately to any leaks or spills that may occur.

An UST system that is operated and maintained by a knowledgeable person is less likely to have petroleum releases or spills to the environment.

To address the need for informed UST operators, the 2005 Federal Underground Storage Tank Compliance Act requires all regulated UST facilities to have properly trained operators by August 8, 2012.

The Federal Underground Storage Tank Compliance Act established three categories of UST operators—Class A, B, and C.

Class A Operator – responsible for the overall UST facility, and may manage employees who are responsible for operating and maintaining the facility. This operator ensures that employees are properly trained to understand leak detection and spill-prevention equipment, ensure product compatibility with equipment, and maintain appropriate records.

Class B Operator – responsible for operation, maintenance, and record keeping at the UST facility on a day-to-day basis. This operator must be familiar with leak detection and spill-prevention systems, spill reporting and response, and record-keeping requirements.

Class C Operator – must be trained to know what actions to take in response to a leak alarm or an emergency, such as a spill at the facility.

Maine has combined the responsibilities of the Class A and Class B operators into a single category called Class A/B. Each facility in Maine must have a minimum of one trained Class A/B operator and one Class C operator. Class A/B operators in Maine may also serve as the Class C operator provided they meet the Class C requirements (see *TankSmart* Training Class "C" Operators module). The online and print versions of *TankSmart* were developed to provide the information needed to be a Class A/B UST operator in Maine.

CLASS A/B TRAINING REQUIREMENTS

Once you feel you are ready, go online to take the test.

Anyone who wishes to serve as a Class A/B operator must pass Maine DEP's UST Operator Examination. The exam questions are based solely on information contained in the *TankSmart* materials. You may take the exam and obtain certification for a specific facility, or for all the facilities for which you are responsible. Anyone can take the training, even if you do not need certification as an UST operator. You can view the training information for as many or as few topics as you wish; however, it is important that you review at least the *TankSmart* topics applicable to your facility or facilities.

Once you feel you are ready, go to ***www.maine.gov/dep/rwm/ust/tanksmartonlineservice.htm*** to register and take the test. If you do not have Internet access, you may be able to access the Internet and take the test at a local library. If you are having problems accessing the online exam, call the Underground Tanks Unit at 207-287-2651.

The online test must be completed within two hours of starting. **You must score at least 80% on the exam to obtain certification.** After passing the exam you will be able to print a certificate to show that you are an official Class A/B UST operator in Maine. **Your *TankSmart* Class A/B certification must be renewed annually, which means you must retake the exam each year.**


BUREAU OF REMEDIATION AND WASTE MANAGEMENT
Division of Oil and Hazardous Waste Facilities Regulation

Certificate of Training
Oil Storage Tank Operator Training

General Operator

General Operator
Has successfully completed operator training and passed the operator training exam in the following areas:

Reserved
Annual Inspection
Automatic Tank Gauge
Ball Float Overfill Protection
Basic Motor Fuel Marketing & Distribution
Cathodic Protection for Tanks & Piping
Class A Operator
Contacting DEP
Dispensers
Double Walled Piping
Double Walled Tank w/Continuous Electronic
Double Walled Tanks w/Manual Monitor
Ethanol Blended Gasoline
Electronic Overfill Protection
Drop Tube Overfill Prevention Valves (Flappers)
Consumptive Use Heating Oil
Introduction to Operator Training
Out of Service Facilities
Pressurized Piping
Record Keeping
Safety
Daily Inventory & Statistical Inventory Analysis
Single Walled Piping
Single Walled Tanks
Spill Buckets
Spills: Clean-up & Reporting
Suction Piping
Training Class "C" Operators
Aboveground Tank

Certificate Number: 000-000

Training Completed and Passed On: 12/ 2/2009
Certificate Expires On: 12/ 2/2011

Once you have obtained your operator certification, you are expected to operate your UST system responsibly and in accordance with Maine Rules.

WHAT MUST YOU DO ONCE YOU ARE CERTIFIED?

Once you have obtained your operator certification, you are expected to operate your UST system responsibly and in accordance with Maine Rules. As a Class A/B operator you are responsible for providing training to your Class C operators (see the *TankSmart* Training Class C Operators module). You must keep certificates for each Class A/B operator and documentation of Class C operator training at your facility (preferably in one notebook). UST operator training

documentation must be presented to inspectors during the annual inspection (see the *TankSmart* Annual Inspection module) and during random compliance inspections by DEP staff. Failure to demonstrate that your facility has certified Class A/B operators and trained Class C operators is a violation of Maine Rules.

WHAT OTHER RESOURCES SHOULD CLASS A/B OPERATORS KNOW ABOUT?

In addition to knowledge about your UST system equipment, operation, and maintenance, Class A/B operators should also be aware of the following:

- **Maine State Law Governing USTs** Available online at: ***www.mainelegislature.org/legis/statutes/38/title38ch3sec0.html*** (See Subchapters 2-A, beginning at Section 541, and 2-B, beginning at Section 561.)
- **DEP Rules for Underground Oil Storage Facilities** (Chapter 691) Available online at: ***www.maine.gov/sos/cec/rules/06/chaps06.htm***
- **DEP Rules for Operator Training** (Chapter 693) Available online at: ***www.maine.gov/dep/rwm/ust/statutesrules.htm***
- **DEP forms, policies, and other information about USTs** Available online at: ***www.maine.gov/dep/rwm/ust/index.htm***
- **Maine Groundwater Oil Cleanup Fund** If you have a spill or leak at an underground oil storage facility, your cleanup costs may be covered by the Fund. (See Title 38 M.R.S.A. §568-A, §569-A and §569-B). Go to: ***www.maine.gov/dep/rwm/groundwater/gwoilclean.htm***
- **The Maine Board of Underground Storage Tank Installers (BUSTI)**
  - Tests and certifies Maine Certified Tank Installers and Inspectors (CTIs).
  - Approves continuing education credits for CTIs
  - Reviews complaints from customers and DEP staff against CTIs
  - May penalize, suspend, or revoke certification of CTIs that violate DEP rules, equipment manufacturer instructions, and the BUSTI Code of Ethics

  Go to: ***www.maine.gov/dep/rwm/ust/board.htm***

  For a list of certified tank inspectors and installers go to: *www.maine.gov/dep/rwm/ust/formslists.htm*
- **Types of enforcement actions** (Notice of Violation (NOV), Administrative Consent Agreement (ACA), Delivery Prohibition, Cleanup Order). Definitions of these enforcement actions are in the Glossary of Terms. (Go to: ***www.maine.gov/dep/rwm/ust/additionalinfo.htm*** and click on Glossary of Terms.)

Maine DEP staff can assist you.

Call: 207-287-2651

TRAINING CLASS C OPERATORS

The Federal Underground Storage Tank (UST) Compliance Act established three categories of operators identified as Class A, B, and C. The Class C operator is the person who is present whenever fuel is being dispensed. Class C operators do not have many responsibilities with regard to UST systems, but the responsibilities they do have are very important. They must know what to do when emergencies such as fires, vehicles hitting dispensers, fuel spills, and alarm conditions on leak detection equipment happen. Class C operators do NOT need to be trained as emergency medical technicians, fire firefighters, or hazardous material spill-cleanup personnel. Class C UST operators DO need to know how to recognize problems, how to quickly shut down the fuel-dispensing system, and who to call (e.g., fire, police, ambulance, facility management personnel) depending on the nature of the incident.

The Class C operator is the person who is present whenever fuel is being dispensed.

In Maine, the Class C operator must be trained by a person holding a certificate as a Class A/B operator. A Class A/B operator may also serve as a Class C operator as long as he or she meets the requirement of being present at the facility whenever fuel is being dispensed. Class C operators do not need to pass a test to show that they have learned what they need to know. However, documentation that Class C training has been provided must be maintained on site.

At unattended facilities, Class C responsibilities must be met by the customers who are fueling their vehicles. In this case, prominent signage explaining what to do if there is a fire, spill, or accident at the facility may serve as "training" for customers.

MINIMUM TRAINING REQUIREMENTS

At a minimum, Class C operators must be trained on:

- How to respond to fuel spills
- What to do when an alarm on a tank-monitoring system sounds
- Identifying potential problems with the UST system (e.g., nozzle is not shutting off properly, leaky dispenser hose, strong gasoline smell from a dispenser)
- Safe fueling procedures (e.g., shut off engine, stay at the nozzle, no smoking, fill portable gas cans on the ground, discharge static before touching the nozzle)

HOW DO YOU DOCUMENT CLASS C TRAINING?

Underground storage tank Class A/B operators must maintain a Class C operator training checklist for each Class C operator. Class A/B operators may design their own training or have a prospective Class C operator use publically available Class C training, provided it covers the topics listed on **Maine's Underground Storage Tank Facility Class C Operator Training Checklist.** (A copy of the checklist is included with this module.) After the Class A/B operator is satisfied that the training has been satisfactorily completed, the Maine checklist must be signed by the Class A/B operator and the Class C operator who received the training to verify completion.

Proof of training must be kept at the facility and produced during annual and compliance inspections by DEP staff.

Proof of training must be kept at the facility and produced during annual inspections (see the *TankSmart* module Annual UST System Inspections) and during compliance inspections by DEP staff. In addition, during DEP inspections, the Class C Operator on duty must demonstrate sufficient understanding of spill-response procedures and monitoring-system-alarm procedures to the DEP inspector.

Besides having the Class C operator training checklist on file, the Class A/B operator must maintain a **Class C Operator Training Record** (included with this module) on site. The training record is a list of all the trained Class C operators at the location. It gives DEP inspectors the ability to check to be sure there are certified people on site and that they are talking with someone who is certified. Names should be added or deleted from the list so that the current Class C operators at a site can be easily identified.

Failure to demonstrate that your facility has trained Class C operators is a violation of DEP rules.

Failure to demonstrate that your facility has trained Class C operators is a violation of DEP rules.

OTHER ONLINE CLASS C TRAINING RESOURCES

The online Class C courses offered by the following companies may be used to assist you in providing training for your Class C operators. Remember that the Class A/B operator must sign a document that shows that the Class C operator has received training. If it is properly completed and signed, the site-specific checklist that is provided as part of the Petroleum Training Solutions Class C course is acceptable documentation that the Class A/B operator has trained the Class C operator.

- **Eclipse:**
  http://training.ecseclipse.com/Class-C-Training.html
- **Petroleum Training Solutions:**
  www.USTtraining.com
- **Practical American Safety Solutions:**
  www.passtesting.com

Maine Department of Environmental Protection
17 State House Station
Augusta, Maine 04333-0017
Phone: (207) 287-2651
www.maine.gov/dep/rwm/ust/index.htm

Underground Storage Tank Facility
Class "C" Operator Training Checklist

All retail and motor fuel underground oil storage tank (UST) facilities must have designated Class "C" operators. Class C Operators, at a minimum, must be trained on the items below by a Maine Certified Class A/B Operator. This form will be used to certify the training provided to a Class C Operator. This form must be kept at the facility and made available to the Department of Environmental Protection upon request.

Check each area of training upon completion

- ☐ UST Facility Components and Functions
- ☐ Fuel Pump Emergency Shut-offs: Location(s) and Usage
- ☐ Leak Detection Console: Warnings, Alarms and Response
- ☐ Evidence of a Possible Leak: Response and Emergency Contacts
- ☐ Responding to Spills: Actions and Procedures
  - O Spill logs: Location and Procedures
  - O Speedi-Dri and Oil Absorbent Pads: Location, Use and Disposal.
- ☐ Safety & Other Emergency Actions: Procedures & Implementation

By my signature below, I certify that I have received training in the listed topic areas.

_____
Printed Name - Class "C" Operator

_____ _____
Signature - Class "C" Operator Date

By my signature below, I certify that I have trained the employee named above in the listed topic areas.

_____
Printed Name - Class "A or B" Operator/Trainer

_____ _____
Signature - Class "A or B" Operator/Trainer Date

This certification is valid for a period of one year from date of completion
Retain this record of training for a minimum of three years

DEP Oil Spill Reporting
In-State / Out-of-State, 24 Hours: (800) 482-0777

January 2010

UNDERGROUND STORAGE TANK
CLASS "C" OPERATOR TRAINING RECORD

Company Name: _____ Reg #: _____

Site Address: _____ City: _____

Underground Storage Tank Class A/B Operators provide annual training to facility employees who have responsibilities associated with the operation and/or maintenance of underground storage tank (UST) systems. At least one of the facility employees present during operating hours must have operator training. This training includes:

- Actions in response to emergencies (situations posing an immediate danger or threat to the public and to the environment, and that require immediate action), system alarms, or petroleum spills and releases
- The employee's role regarding UST monitoring equipment
- The employee's role regarding spills and overfills
- Name(s) of contact person(s) for emergencies and monitoring equipment alarms

The following employees have been trained:

Employee Printed Name	Hire Date	Training Date	Employee Signature

Facilities must retain this certificate for a minimum of 3 years.

Me-DEP January 1, 2010

ANNUAL UST SYSTEM INSPECTIONS

ALL underground fuel storage systems must be inspected **annually** by a licensed inspector or installer. This annual inspection is the most crucial element in the management of your storage system. The inspector reviews all of the equipment required under Maine's underground storage tank (UST) regulations—including checking spill prevention and leak detection equipment, corrosion protection, and the required paperwork. (See a sample Inspection Summary on page 4.) This is your opportunity to find out whether your UST system's release detection and prevention equipment is working properly and, if not, to figure out what you need to do to fix it.

All underground fuel storage systems must be inspected annually by a licensed inspector or installer.

If you do not submit a passing annual inspection, the DEP may issue an order prohibiting fuel deliveries to your facility. Do not ignore the annual inspection requirement.

FYI: For a list of Maine-Certified Tank Inspectors and Installers, visit:

www.maine.gov/dep/rwm/ust/formslists.htm

or call 207-287-2651 and ask to speak to a Tanks Unit staff person.

GETTING READY

Preparing for your inspection will save you and the inspector time and effort. To get ready, be sure to have the following documents on hand for the inspector:

- ❍ Maine DEP tank registration paperwork
- ❍ Last year's inspection report form, if available
- ❍ The last 12 months of leak detection records in chronological order
- ❍ Last year's cathodic-protection test, if you have steel tanks and/or piping
- ❍ Copies of all maintenance and service records from the past year
- ❍ Any owner's manuals or warrantees on parts and equipment related to your tank system
- ❍ Training certificates for all Class A/B operators, training checklists for all Class C operators, and the training record that lists all Class C operators (see *TankSmart* Training Class C Operators module)

PASSED THE ANNUAL INSPECTION?

You must submit a PASSING Annual Inspection Report, filled out and signed by your inspector, to the DEP *no more than 30 days after your inspection is completed.* For example, if your facility is inspected on May 1, 2009, the report of the inspection must be sent to the DEP by May 31, 2009. On that schedule, your next annual inspection must be completed by May 1, 2010. Copies of Annual Inspection Reports must be kept at your facility for 3 years.

Copies of the Annual Inspection Form can be obtained online at: ***www.maine.gov/dep/rwm/ust/formslists.htm***, or by calling 207-287-2651. The installer or inspector you contract with typically has his or her own blank copies. Any failures noted in the inspection report must be corrected within 30 days.

Any failures noted in the inspection report must be corrected within 30 days.

Common Problems Found During Annual Inspections

Equipment

- Broken or inoperative equipment
- Failure to retrofit an overfill device
- Failure to maintain the corrosion-protection system

Operation and Maintenance

- Failure to keep spill buckets clean
- Failure to maintain leak detection equipment
- Failure to accurately check for leaks once a month
- Failure to reconcile daily inventory monthly and do a 1% leak check

Record Keeping and Reporting

- Failure to keep your tank registration on-site
- Failure to submit annual inventory analysis
- Failure to notify the DEP of change of ownership
- Failure to have training certificates for all Class A/B operators, training checklists for all Class C operators, and the training record that lists all Class C operators

FAILED THE ANNUAL INSPECTION?

Finding a problem before a release happens is a blessing. Broken or missing equipment can be identified without penalty or fine from the DEP—as long as you fix the problem within 30 days. Simple problems can be corrected during the inspection; otherwise you must correct deficiencies discovered during the inspection within 30 days. If a problem cannot be corrected in 30 days, contact the DEP Tanks Unit at 207-287-2651 to make alternative arrangements.

What to do if:

- **Equipment must be replaced.** Submit a Facility Upgrade Form to the DEP and arrange for a qualified person to do the work. Facility Upgrade Forms can be obtained online at ***www.maine.gov/dep/rwm/ust/formslists.htm*** or by calling 207-287-2651.
- **Piping must be replaced.** Submit a full Registration Form to the DEP and arrange for a qualified person to do the work.
- **There are paperwork deficiencies (e.g., daily inventory, monitoring logs).** Most deficiencies can be corrected by the owner or operator. Contact the DEP Underground Tanks Unit at 207-287-2651 to determine how you can correct the violation.

After Problems Are Fixed...

After repairs or deficiencies are corrected, and all of your tanks **PASS** the annual inspection, mail the completed Annual Inspection Form to:

Annual UST Inspections
Maine DEP
17 State House Station
Augusta, ME 04333-0017

NOTE: The inspector you hire may offer to submit the report to the DEP for you. But keep in mind, if the DEP does not receive the report, the law holds the owner of the facility responsible.

Your installer or inspector must use this inspection form.

Maine Department of Environmental Protection
Underground Storage Tank
Annual Inspection Summary

Facility Name	Owner	Reg. #
Location	Operator	Phone

Tank Number												
Volume												
Product												
Pump Type												
	Pass	Fail	N/A	Pass	Fail	N/A	Pass	Fail	N/A	Pass	Fail	N/A
Daily Inventory												
Automatic Tank Gauge												
Groundwater Monitoring												
Interstitial Monitoring												
Line Leak Detectors												
Heating Oil Tank Piping												
Overfill Prevention												
Spill Buckets												
Stage I Vapor Recovery												
T/C 1st Gen Yellow Piping												
Dispenser Area												
Cathodic Protection												
Temp. Out-of-Service												
Any FAIL in the columns above means a FAIL for that tank.	Pass	Fail	N/A	Pass	Fail	N/A	Pass	Fail	N/A	Pass	Fail	N/A

By signing this form, I certify that:
I performed this inspection and believe the contents of this report to be complete and accurate at the time of the inspection, and, that I am a properly certified Maine Underground Oil Storage Tank Installer or Inspector.

Name & CTI No. (please print)	Date	Signature

By my signature below, I certify that:
All inspection items are passing and any deficiencies discovered during the inspection have been corrected.

Name & CTI No. (please print)	Date	Signature

The facility owner must submit a passing UST Inspection report to MeDEP within thirty (30) days after the inspection is completed to:	UST Annual Inspection, Maine Department of Environmental Protection, 17 SHS, Augusta, ME 04333-0017

!!! KEEP A COPY OF THIS FORM FOR YOUR RECORDS !!! Revision Date: 02/01/2010

RECORD KEEPING

Missing or incomplete paperwork is one of the most frequent causes of regulatory citations. Keeping your underground storage tank (UST) system records in order is an important way to demonstrate to an inspector that you are in compliance with Maine's rules. Nothing is more frustrating to an inspector (and raises more suspicion) than sloppy records. Organized records help make your regulatory inspection go smoothly and are much appreciated by the inspector.

Missing or incomplete paperwork is one of the most frequent causes of regulatory citations.

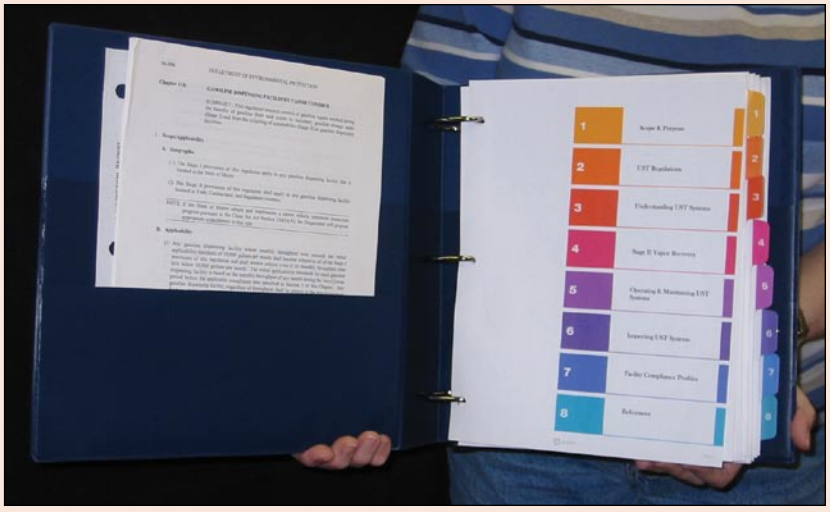
Be sure to assign record-keeping responsibilities to a conscientious person (or take on that responsibility yourself), be clear about what records are needed, and hold this person accountable for keeping all UST records in an organized manner. A three-ring binder with tabbed dividers is a good way to organize your information so that it is easily located.

You are required to keep records either at the UST facility itself or at the UST owner's primary place of business. You must keep records for 3 years and be able to provide any records to the DEP or municipal officials within 36 hours of an information request.

ALL facilities must have the following documents:

- **Maine DEP Facility Registration Certificate** (This document should be posted in a visible location at your facility. See the sample certificate on the following pages.)
- **Annual Inspection Report** (See the *TankSmart* Annual Inspection module.)
- **Spill Log** (See the *TankSmart* Spills: Clean-up & Reporting module.)

The most recent versions of these documents should be readily accessible in case a DEP inspector arrives to conduct an unannounced inspection.



Courtesy of Marcel Moreau Associates, Portland Maine.

Having all your UST records organized in a tabbed three-ring binder helps make regulatory inspections go smoothly.

CAN'T FIND YOUR REGISTRATION CERTIFICATE?

If you would like a copy of your current Facility Registration Certificate, go to:

www.maine.gov/cgi-bin/online/tanksmart/index.cgi

and follow the instructions to print out a certificate. If you do not have Internet access, call the DEP Tanks Unit at 207-287-2651 and ask to have a copy of the certificate mailed to you.

SAMPLE FACILITY REGISTRATION CERTIFICATE

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Date of Certificate:
January 12, 2010

FACILITY REGISTRATION CERTIFICATE FOR

Aboveground and Underground Storage Tank

Please display this certificate in a visible location at the registered facility.

Facility:

Facility Name
Street Address
Town

Facility Registration Number: XXXXXX

Date of Registration: July 10, 1986

Facility Phone: 207-123-4567

Operator:

Operator Name
Street Address
Town
Phone Number

Sensitive Area Status:

Facility Use: RETAIL FACILITY

Owner:

Owner Name
Street Address
Town
Phone Number

Aboveground and Underground Storage Tanks

Number of Active Aboveground Tanks: 1
Number of Active Underground Tanks: 4

If the information on this form is accurate and complete, please retain for you records.

The Maine Department of Environmental Protection must be notified of any errors or changes in the information on this form. To accomplish this, please draw a line through the incorrect or outdated information, insert the correct information, and return this form to:

Department of Environmental Protection Bureau of Remediation and Waste Management
State House Station #17 Augusta, ME 04333

Attn: Underground Tanks Program

If you have any questions concerning this process, please call (207)287-2651 and ask for the administrator of the Underground Storage Tanks Program

This certificate is an essential document and should be posted in a visible location at your facility. It's a good idea to keep a copy in your files as well.

WHAT OTHER RECORDS ARE YOU REQUIRED TO MAINTAIN?

Other records required for your UST system depend on the kinds of components in your system. (See the appropriate *TankSmart* modules.) If applicable to your facility, you must keep the following records:

- **Daily inventory.** (See *TankSmart* Daily Inventory & Statistical Inventory Analysis module.)
- **Annual statistical inventory analysis (SIA).** (See *TankSmart* Daily Inventory & Statistical Inventory Analysis module.)
- **Corrosion-protection monitoring and repair.** (See *TankSmart* Cathodic Protection for Tanks & Piping module.)
- **Line leak detector testing, maintenance, and repairs.** (See *TankSmart* Piping: Pressurized Pumping Systems module.)
- **Overfill-prevention equipment inspection results, maintenance, and repairs.** (See *TankSmart* Overfill Prevention modules for Ball Floats, Electronic Alarms, or Drop Tube Shutoff Valves.)
- **Leak detection monitoring results, maintenance, and repairs.** (See *TankSmart* modules that apply to your tank and piping leak detection methods.)
- **Documentation of Class A/B UST operator training.** (See *TanksSmart* Class A/B Operators module.)
- **Documentation of Class C UST operator training.** (See *TankSmart* Class C UST Operator Training module.)
- **Product-compatibility information for ethanol-blended fuel.** (See the *TankSmart* Ethanol-Blended Gasoline module.)
- **Monthly throughput log.** (See the *TankSmart* Stage I Vapor Recovery module.)

Other records required for your UST system depend on the kinds of components in your system.

SPILLS: CLEANUP & REPORTING

Spilled fuel from any source at your facility must be addressed immediately. All spills—even relatively small spills—can contaminate drinking water supplies as well as our lakes, rivers, and streams. Small, ongoing drips, for example, can add up to a lot of spilled fuel over time. Spills onto areas that are not paved, such as soil and gravel, are a particular threat to groundwater. There are many potential spill sources (e.g., during fuel delivery into the storage system, customers filling vehicles, dispenser leakage into soil, leaking hoses and nozzles). Facility operators need to be tuned in to all spill possibilities and know what to do if a spill occurs. Spill cleanup and reporting are top priorities.

Spilled fuel from any source at your facility must be addressed immediately.

POTENTIAL SPILL SITUATIONS

Overfill spill into soil.

Spills to gravel.

Spill not cleaned up within 24 hours.

No dispenser sump —drips go into soil.

Courtesy of Marcel Moreau Associates, Portland Maine.

DO YOU HAVE EMERGENCY SPILL-RESPONSE PROCEDURES?

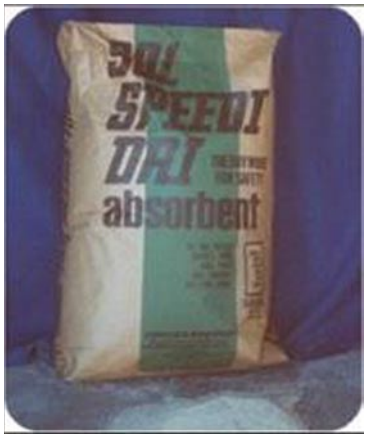
Your facility should have an emergency action plan that includes emergency-response procedures that describe the actions an operator must take should a spill occur. Be sure to review spill-response procedures for your facility periodically and ensure that all facility personnel are familiar with the action plan. If you have not yet established emergency procedures, **NOW** is a good time to do so.

Spill-response procedures should include the following actions:

- Clean up all leaks, drips, and spills immediately
- Keep appropriate spill cleanup materials handy at all times
- Know who to contact (e.g., Maine DEP, fire department)
- Maintain a written log of **ALL** spills—what happened and what was done to clean them up

SPILL CLEANUP

If a spill occurs, take appropriate measures, such as turning off leaking equipment, to prevent further fuel flow, including drips. Use absorbent materials to soak up as much spilled fuel as possible. Never leave fuel-soaked materials laying around—they are a fire hazard. Fuel-contaminated soils and fuel-soaked materials should be stored temporarily outside in a closed metal container and disposed of properly.



Speedi-dri and cat litter will release any soaked up oil if they become wet. These materials must be cleaned up as soon as any spilled oil is absorbed. They do not absorb a spill in the rain.

Oil sorbent pads only soak up oil. They repel water and can be used to soak up spills even if it is raining or the spill occurs in a wet area.

SPILL REPORTING

ALL SPILLS MUST BE REPORTED TO THE DEP! The DEP must be notified within 24 hours of discovery. The Spill Reporting Hotline is available 24 hours a day, 7 days a week.

Spill Reporting Hotline

1-800-482-0777

NOTE: There is one spill-reporting exception for UST facilities only: Surface spills of less than 10 gallons on a paved concrete or asphalt surface that do not reach groundwater or surface water and that are cleaned up within 24 hours. You can fulfill your reporting requirement for these spills only by recording them in your spill log.
In all other cases, you must call the DEP to report a spill every time any amount of fuel is dripped, leaked, or spilled.

All Spills Must Be Reported to the DEP!

Spill Reporting Hotline 800-482-0777

SAMPLE SPILL LOG

UNDERGROUND OIL STORAGE FACILITY SPILL LOG OF DISCHARGES OF 10 GALLONS OR LESS WHICH WERE NOT REPORTED TO THE D.E.P.

DATE DISCHARGE DISCOVERD	SOURCE OF DISCHARGE	LOCATION OF DISCHARGE AT FACILITY	DATE OF CLEAN-UP	METHOD OF CLEAN-UP	SIGNATURE OF OWNER OR MGR.

IMPORTANT: Petroleum discharges (spills) of 10 gallons or less do not have to be reported to the Department IF: (1) The spills are fully cleaned up within 24 hours, and: (2) A written log (like the one above) of the spills is kept on file for the life of the facility.
Note : This applies only to surface spills involving underground oil storage tanks. **All other spills above 10 gallons, spills not associated with and underground oil storage facility, or evidence of a leaking underground oil storage facility must be reported to the Department of Environmental Protection within 24 hours of their occurrence.**
To report a leak or spill at any time, 24 hours a day, seven (7) days a week, call 1-800-482-0777

Log Sheet #5

SAFETY

We don't get particularly concerned for our safety when we fuel our vehicles because fuel-related accidents are infrequent. But there are many hazards present at motor-vehicle fueling facilities, and accidents can and do happen. The two biggest safety concerns at these facilities are fire and vehicle traffic. Other safety concerns include customer inattention, chemical hazards, improper electrical work, and excavation around USTs. All classes of UST operators should know how to minimize the risk of an emergency and know how to respond if one occurs.

There are many hazards present at motor-vehicle fueling facilities, and accidents can and do happen. The two biggest safety concerns at these facilities are fire and vehicle traffic.

Accidents and leaks can occur when personnel who are not properly trained or lack the proper equipment attempt UST maintenance and repair activities. Work on UST systems is often performed in an environment where there is vehicular traffic; flammable, combustible, and toxic fuels and vapors; electrical hazards; and other potential threats to health and safety. People working around UST systems are responsible for their own safety as well as the safety of anyone else in the work area and must take appropriate precautions. Only properly trained and equipped individuals should be doing this work.

Though rare, fuel-related fires can and do happen.

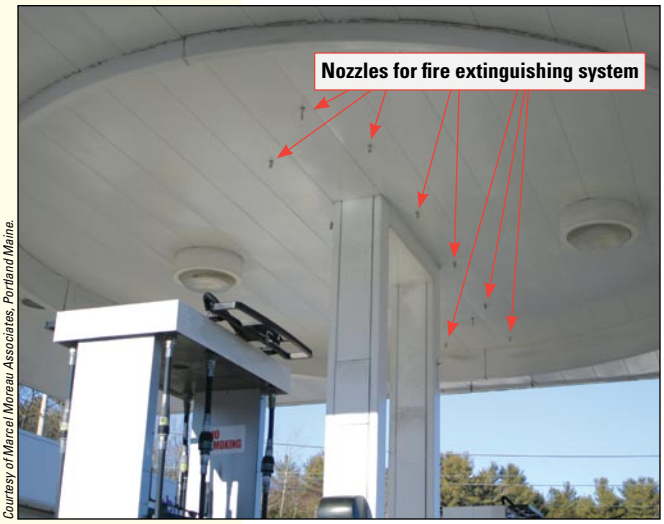
As a Class A/B operator, it is your responsibility to ensure that only trained and qualified individuals are doing inspection, maintenance, or repair work on your UST systems. You are also responsible for providing the appropriate safety training and equipment to Class C UST operators and any other on-site employees.

The *Petroleum Equipment Institute's Recommended Practices for Inspection and Maintenance of UST Systems*, RP 900-08, is an excellent resource for learning about the safety issues usually present at UST facilities. To obtain a copy and learn more about petroleum and UST safety issues, go to: ***www.pei.org/RP900,*** or call 918-494-9696.

Courtesy of Marcel Moreau Associates, Portland Maine.

Accidents are often caused by drivers who are distracted and inattentive as they maneuver their vehicles around the site.

WHAT YOU SHOULD KNOW ABOUT PREVENTING FIRE HAZARDS



Courtesy of Marcel Moreau Associates, Portland Maine.

Most retail gas stations in Maine are equipped with automatic fire-extinguishing systems in the canopy. Though they largely go unnoticed, these systems play a critical role in putting out fires that may occur in the dispenser area.

Because your facility receives, stores, and dispenses flammable and/or combustible liquids, you are responsible for:

- Ensuring that there are no ignition sources anywhere near flammable vapors.
- Ensuring that all of the fire-suppression systems (e.g., portable fire extinguishers, automatic fire-extinguishing systems typically installed within canopies above dispensers) present at the facility are periodically serviced so they will operate properly when they are needed.
- Ensuring that your fuel-delivery person monitors all product deliveries to prevent overfilling the tank and causing a spill. (See the *TankSmart* Overfill Prevention module that applies to your facility.)
- Knowing what to do if a vehicle accident, fuel spill, or fire occurs. **You and your employees must know where the emergency pump shut-off switch is located and how and when to use it.** The "emergency stop" or "all stop" button on your cash register or point-of-sale system is NOT the same as the emergency pump shut-off switch. These buttons only stop the flow of fuel from the dispenser. They do not stop the pump motor nor do they shut off the electrical supply to the dispenser. Contact your pump service technician if you do not know where your emergency pump shut-off switch is located.

Courtesy of Marcel Moreau Associates, Portland Maine.

Activating the emergency fuel shut-off switch is most often the first thing to do in a serious fueling emergency. Activating the switch stops all fuel flow by shutting down all pump motors and cuts off the electricity to all fueling components so that electrical sparks cannot be generated.

- Ensuring that proper safety signage is posted. (For language to use on safety signage, see the National Fire Protection Association Code 30A, *Motor Fuel Dispensing Facilities and Repair Garages*.)

Ensure that all of the fire-suppression systems present at the facility are periodically serviced so they will operate properly when they are needed.

- Knowing what to do if there is a spill. **To prevent fires and protect the environment, all spills must be cleaned up immediately.** (See the *TankSmart* Spills: Cleanup & Reporting module.)
- Visually checking your dispensing equipment, including hoses, breakaway valves, and nozzles on a regular basis to ensure that they are working properly, are in good condition, and are not leaking. (See the *TankSmart* Dispensers module.)
- Ensuring that self-serve customers and fueling attendants follow proper fueling procedures, including:
  - Turning off the vehicle ignition
  - Filling only containers approved for petroleum and placing containers on the ground when filling them
  - Staying outside the vehicle and near the nozzle until the fueling is complete and the nozzle is hung back on the dispenser
  - Not smoking near the fuel dispensers
  - Discharging static electricity before touching any nozzle that is inserted in a vehicle

Courtesy of Marcel Moreau Associates, Portland Maine.

To prevent fires ignited by static electricity, gasoline should only be dispensed into approved containers that are sitting on the ground.

The State Fire Marshal's Office regulates fuel dispensers, fire-suppression systems, aboveground storage tanks, transportation of flammable liquids, and other areas related to fire safety.

For more information on FIRE SAFETY, go to the Fire Marshal's website at *www.maine.gov/dps/fmo/index.htm*

or Call: 207-626-3870.

WHAT YOU SHOULD KNOW ABOUT AVOIDING VEHICLE HAZARDS

One of the more serious and common hazards at fueling facilities is people being struck by vehicles, especially around the fuel dispensers. These accidents are often caused by drivers who are distracted and inattentive as they maneuver their vehicles around the site and fail to notice personnel conducting inspections or doing maintenance work.

Use vehicles or other equipment such as barriers, safety cones, or barrier tape to isolate work areas. Workers should wear high-visibility safety vests. Keep tools or equipment inside the barrier. Do not remove any safety equipment until all of the work is done.

One of the more serious and common hazards at fueling facilities is people being struck by vehicles, especially around the fuel dispensers.

ELECTRICAL HAZARDS

Improper electrical work can produce sparks that can ignite fuel vapors, present electrocution hazards, and even result in explosion hazards inside a building when vapors travel through improperly sealed electrical conduits. Wiring USTs is not a job for amateurs.

Electrical work involving UST systems must be done according to special codes designed to minimize fire and explosion hazards from electrical sparks. Improperly installed or worn electrical equipment can create fire, explosion, or electrical shock hazards. A licensed electrician who is qualified to do work in locations where flammable vapors may be present must oversee all electrical work.

CHEMICAL HAZARDS

Petroleum fuels are complex mixtures of chemicals that can produce a wide variety of harmful effects when they are inhaled or come in contact with skin. Anyone working in the vicinity of a fuel-storage system should read and understand the relevant Material Safety Data Sheets and receive appropriate first-aid training.

BEFORE YOU DIG...

UST facilities are complex installations with buried tanks, piping runs, and electrical wiring. A certified tank installer must oversee any excavation, backfilling, or paving at a fueling facility if it is within 10 feet of the following:

- A dispenser island
- Piping runs
- Vent pipes
- The tank pad

No excavation or other activities that can ignite gasoline vapors are allowed within 20 feet of a gasoline dispenser unless the electrical power supply has been turned off and all fueling activity has stopped.

UST facilities are complex installations with buried tanks, piping runs, and electrical wiring. Consult a tank installer who is knowledgeable about your facility before undertaking any excavation work.

TANKS: DOUBLE-WALLED with CONTINUOUS ELECTRONIC MONITORING

As of September 16, 1991, all underground storage tanks installed in Maine must be double-walled. Double-walled tanks are, in essence, a tank within a tank and designed to prevent releases into the environment by containing fuel leaking out from the inner tank in the "interstitial space" between the two walls of the tank. When the interstitial space is monitored continuously and alarms are addressed as they occur, fuel can be prevented from reaching the environment.

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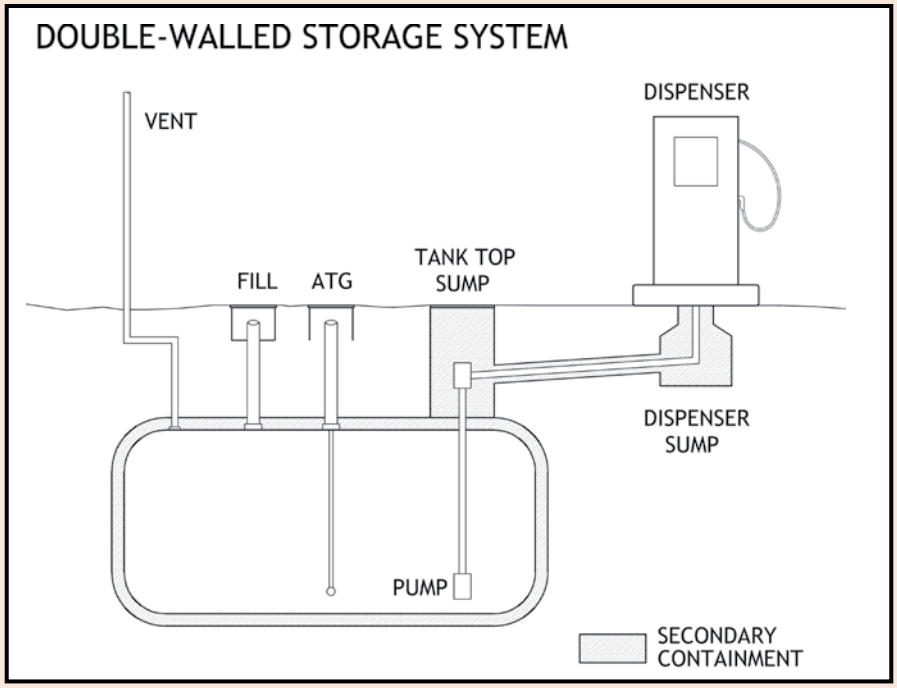
Double-walled tanks can be fashioned with both walls made of either steel or fiberglass or with an inner steel tank and an outer containment vessel constructed of fiberglass or polyethylene plastic, generally known as "jacketed" tanks.

Double-walled tank technology is generally considered to be the most secure form of fuel storage, but a double-walled tank is only as good as how well you know your leak-monitoring system, what it tells you, and how to respond.

Leak detection for double-walled tanks is known as interstitial monitoring. Since September 16, 1991, sensors must be used to continuously monitor for leaks in interstitial spaces. Periodic visual inspection of tank interstitial spaces is not allowed for tanks installed after September 16, 1991.



Courtesy of David Matero.

Double-walled tanks are the most secure form of fuel storage, but they are only as effective as the people who operate them.

NOTE: In some double-walled tanks (e.g., STI P3), both walls are made of steel (subject to corrosion). If you have such tanks, they will have cathodic protection to prevent corrosion. (See the *TankSmart* Cathodic Protection for Tanks & Piping module.)

HOW DOES INTERSTITIAL MONITORING DETECT LEAKS IN TANKS?

Interstitial monitoring is a leak detection method that is used with double-walled tanks and piping.

Interstitial monitoring is a leak detection method that is used with double-walled tanks and piping. It is the only method of leak detection that can actually PREVENT a release to the environment, because the alarm should sound when the product is still contained within the outer wall of the tank or pipe. A sensor is placed in the interstitial space and then connected to a console that continuously monitors for leaks and triggers an alarm if a problem is detected. Many consoles are combined with an automatic tank gauge (ATG). In either case, sensors will trigger an alarm at the console whenever the sensor detects liquid.

There are two types of sensors: discriminating and non-discriminating. A discriminating sensor can tell the difference between fuel and water and provides a different alarm for each type of liquid. A non-discriminating sensor, by far the most commonly used, only tells you that a liquid is present. With non-discriminating sensors, you have to visually investigate to determine whether fuel or water has triggered the alarm.

You should keep a list of all the sensor locations with the sensor identification number or label posted close to the alarm console so you (and the service technician) can quickly tell which tank is causing the alarm.

The biggest issue with interstitial monitoring is:

OPERATORS NOT PAYING ATTENTION TO ALARMS!

Not all alarms are due to leaks, but ignoring any alarm defeats the purpose of having a leak-monitoring system. Large leaks have gone undetected when operators ignored an alarm. Most consoles indicate alarms with audible beeping or a horn and an illuminated red light. Systems with digital displays also describe the alarm (e.g., "L1: Fuel Alarm" indicates liquid is present at the location where sensor L1 is installed). Respond immediately to any audible alarm or blinking red or yellow lights!
If you do not know what to do, call your service technician or the DEP (207-287-2651).

An ATG tank monitor in alarm.

Courtesy of Marcel Moreau Associates, Portland Maine.

A tank interstitial leak sensor in alarm.

Do not cover up or ignore alarms. In this photo, a piece of paper was taped over the alarm lights so they could not be seen. This is NOT the proper response to an alarm!

WHAT SHOULD YOU DO IF YOUR ELECTRONIC MONITOR ALARMS?

Check your monitoring system EVERY DAY for alarms, which are evidence of a possible leak. If your console is in alarm, take the following steps:

- Report evidence of a possible leak to the DEP within 24 hours.
  Call 207-287-2651 (workdays 8AM – 5 PM), or 1-800-482-0777 anytime.
- Contact your tank installer or inspector immediately to determine the cause of the alarm.

To ensure your sensors are working properly, they must be inspected as part of your annual inspection by a Maine-certified tank installer or inspector.

TANKS: DOUBLE-WALLED with MANUAL MONITORING

Double-walled tanks are, in essence, a tank within a tank and designed to prevent releases into the environment by containing fuel leaking out from the inner tank in the "interstitial space" between the two walls of the tank. Double-walled tanks can be fashioned with both walls made of either steel or fiberglass or with an inner steel tank and an outer containment vessel constructed of fiberglass or polyethylene plastic, generally known as "jacketed" tanks.

Double-walled tanks are a tank within a tank and designed to prevent releases into the environment by containing fuel leaking out from the inner tank in the "interstitial space" between the two walls of the tank.

> **NOTE:** In some double-walled tanks (e.g., STI P3), both walls are constructed of steel, which is subject to corrosion. If you have such tanks, they will have cathodic protection to prevent corrosion. To learn how to operate this type of UST, see the *TankSmart* Cathodic Protection for Tanks & Piping module.

Double-walled tank technology is generally considered to be the most secure form of fuel storage. But a double-walled tank will not protect the environment by itself. To be effective, tank systems require a skilled operator. As a UST operator, you must know your leak-monitoring system, what it tells you, and how to respond.

Leak detection for double-walled tanks is known as interstitial monitoring. **Tanks installed after September 1991 must have continuous leak monitoring using sensors installed in the interstitial spaces. If your tank was installed before September 1991, it may not have continuous electronic monitoring, and you must manually monitor the interstitial space.** Check your Registration Certificate if you need to determine the installation date for your tank. (See the *TankSmart* Record Keeping module for more information about Registration Certificates.)

In addition to manual monitoring, **if fuel in the storage system is used in the marketing or distribution of oil (e.g., gasoline or diesel dispensed into vehicles or heating oil sold to off-site customers), you must also keep Daily Inventory records and submit Annual Statistical Inventory Analyses to the DEP** (See the *TankSmart* Daily Inventory & SIA module.)

HOW DO YOU MANUALLY MONITOR THE INTERSTITIAL SPACE OF YOUR DOUBLE-WALLED TANK?

If you don't have electronic monitoring for your tank, you must visually check your tank's interstitial space every week for fuel or water.

If you don't have electronic monitoring for your tank, you must visually check your tank's interstitial space every week for fuel or water. To find your interstitial access, look for a round, flat metal cover, usually about a foot in diameter, located in the concrete pad over the top of your tank(s). The cover may be marked with a triangle (see photograph below), or it may have no identifying markings on it at all. Remove the metal cover and you will find a cap that seals the top of the pipe that leads down into the tank interstitial space.

Courtesy of Marcel Moreau Associates, Portland Maine.

The bottom of the vertical pipe on the end of this double-walled steel tank connects to the interstitial space. By inserting a gauge stick to the bottom of the pipe after the tank is installed, water or fuel in the interstitial space can be detected.

Courtesy of Marcel Moreau Associates, Portland Maine.

Access covers to tank interstitial spaces are usually flat metal plates about 8 to 12 inches in diameter. They may be marked with a triangle like this one or have no markings at all. Call your service technician if you need help locating your tank interstitial access covers.

Use the following steps to check the interstitial space for each of your tanks:

- Apply water-detecting paste to the bottom inch or so of one side of a CLEAN gauge stick.
- Apply fuel-detecting paste to the bottom inch or so of the opposite side of the stick on which you applied the water-detecting paste.
- Insert the gauge stick into the interstitial space until it touches the bottom of the tank.
- Leave the stick in the bottom of the tank for the amount of time recommended by the paste manufacturer (usually less than a minute).
- Remove the stick and check to see if either the water- or fuel-detecting pastes have changed color. A color change in either paste indicates the presence of liquid, which is evidence of a possible leak and must be reported to the DEP within 24 hours (see phone numbers below) and be investigated by a service technician.
- If neither paste has changed color, you may use this procedure to check any other tanks you have on-site without having to re-apply the water- and fuel-detecting pastes.
- When you have checked all of your tanks, wipe the water- and fuel-detecting pastes off the stick.
- Keep a log of your weekly monitoring results (see sample log on page 4). This log form is available on DEP's website at: ***www.maine.gov/dep/rwm/ust/formslists.htm***. If you do not have Internet access, call the DEP at 207-287-2651 and ask to have copies mailed to you.

Use these steps to check the interstitial space for each of your tanks.

Report evidence of a possible leak to the DEP's Tanks Unit

207-287-2651

or call the 24-hour Spill Hotline

1-800-482-0777

Keep a log of your weekly monitoring results.

WEEKLY MONITORING LOG

Interstitial Monitoring Log for Doublewalled Systems

Facility Name _____ Tank Size _____

Location _____ Product (s) _____

Date	Fuel?	Water?	Initials of Person Sampling Sump

Instructions: Use a clean stick, not one that has been used previously in an oil tank. At the very bottom of the stick, dab a small amount of gas paste one side and a small amount of water paste on the other side. Lower the stick to the bottom of the interstitial sump and raise it back up. If either gas paste or water paste has turned color, clean the stick and repeat the procedure. If either the gas paste or the water paste has again turned color then the Department should be promptly notified. Call 1-800-482-0777 as soon as possible and within 24 hours. If the paste has not changed color simply fill in the date in the left-hand column, enter "None" in the product and water columns above and put your initials in the right-hand column. Check weekly.

KEEP THIS COMPLETED FORM ON SITE FOR THREE YEARS

TANKS: SINGLE-WALLED

Today, most underground fuel storage tanks in Maine are double-walled. However, there are still some older single-walled tanks that were installed before September 16, 1991. Double-walled tanks provide a safety net to keep a leak out of the environment. With single-walled tanks, you are walking a tightrope without a net—any leaks go straight into the environment. If you have single-walled tanks, it is particularly crucial that you follow leak detection and monitoring requirements diligently.

With single-walled tanks, you are walking a tightrope without a net—any leaks go straight into the environment.

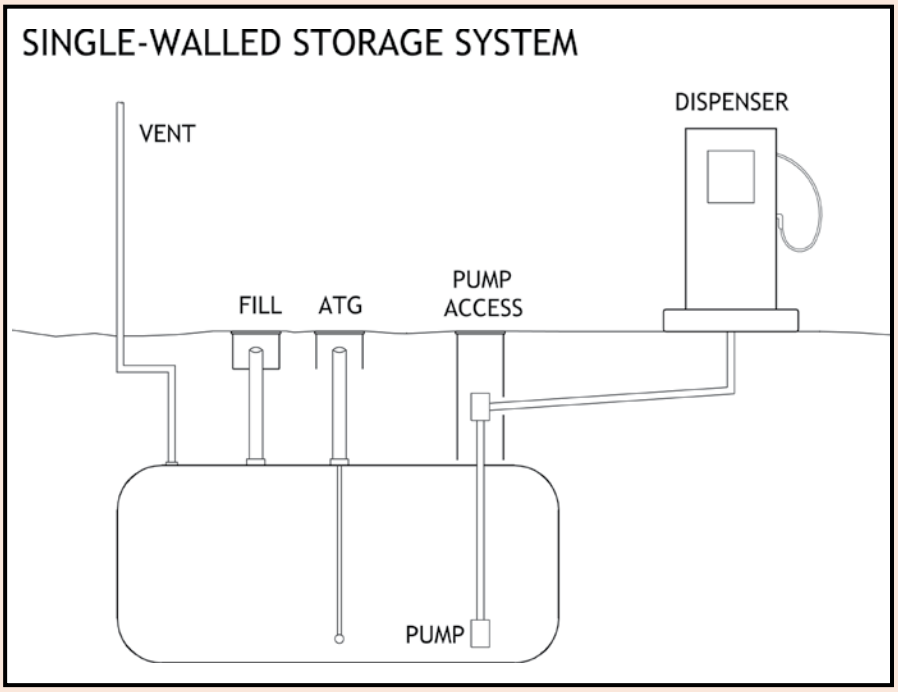
For single-walled tanks, your leak detection options are:

- Perform Daily Inventory and do annual Statistical Inventory Analysis. (See the *TankSmart* Daily Inventory & SIA module.)

  OR

- Use an Automatic Tank Gauge to monitor the level of fuel in your tank and detect leaks of 0.2 gallon per hour, together with an appropriate leak detection method for the piping. (See the *TankSmart* Automatic Tank Gauge module and the Piping: Pressurized Pumping Systems, Double-Walled, or Suction Pumping Systems modules.)

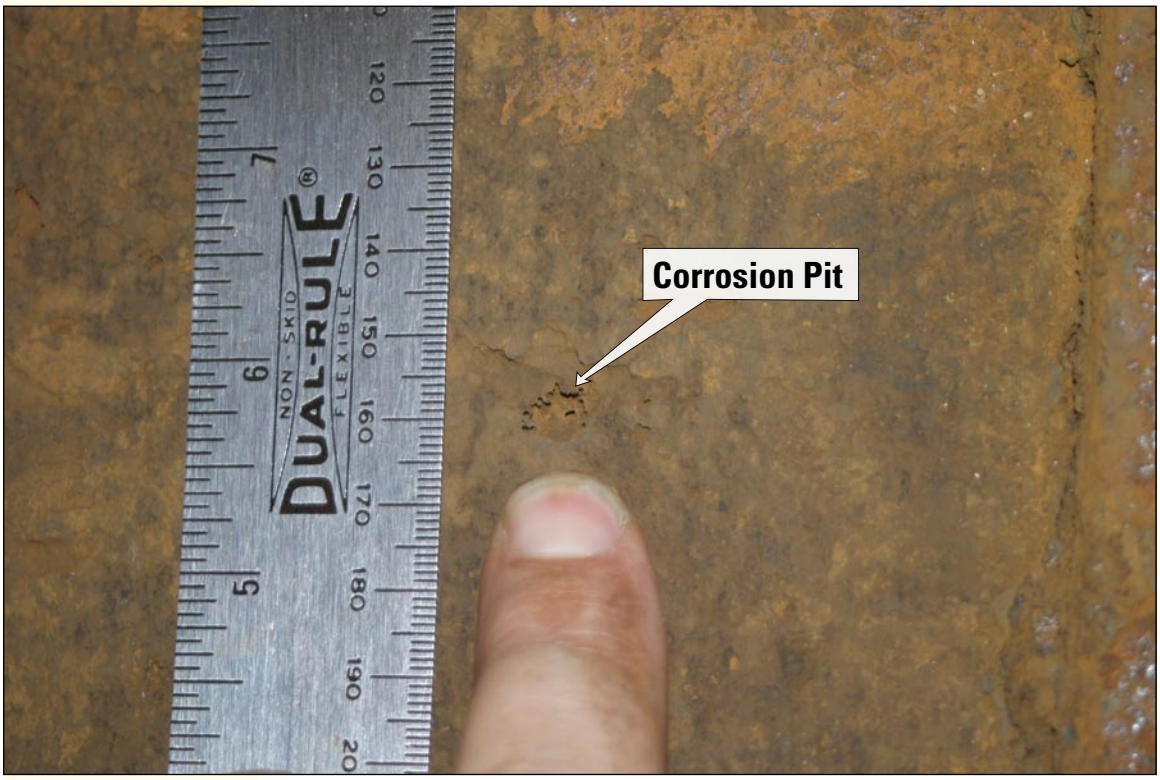
NOTE: Single-walled tanks are made of either steel (subject to corrosion) or fiberglass-reinforced plastic (FRP). If you have steel single-walled tanks, they will have cathodic protection to prevent corrosion. (See the *TankSmart* Cathodic Protection for Tanks & Piping module.)



Courtesy of David Matero

Single-walled storage systems have no safety net. Catching leaks early is particularly important if you have a single-walled storage system.

With single-walled tanks you must report all leaks, no matter how small they may seem, to the DEP within 24 hours of discovery.



Courtesy of Marcel Moreau Associates, Portland Maine.

Single-walled tanks are buried directly in the ground. Even very small leaks are released directly into the environment, where they can cause significant contamination if they are not detected in a timely fashion.

Report evidence of a possible leak to the DEP's Tanks Unit
207-287-2651

or call the 24-hour Spill Hotline
1-800-482-0777

DAILY INVENTORY & STATISTICAL INVENTORY ANALYSIS

Daily Inventory and Statistical Inventory Analysis (SIA) are inventory control procedures for determining how much fuel is going into and out of your fuel tank to determine if there is a leak. Daily Inventory with SIA is a leak detection option used for single-walled tanks, single-walled piping, and double-walled tanks and piping without electronic monitoring installed before September of 1991.

Daily Inventory and Statistical Inventory Analysis (SIA) are inventory control procedures for determining how much fuel is going into and out of your fuel tank to determine if there is a leak.

To meet Maine's leak detection requirements, daily inventory must be used with annual SIA. SIA is a mathematical process that analyzes daily inventory data to more accurately assess whether or not a leak exists in the tank(s) or piping. The SIA is conducted by statisticians who must be approved by the DEP.

The SIA provider uses a computer program to look more closely at the inventory data to determine if you might have a leak. The SIA company then provides you with a report of whether the records pass, fail, or are inconclusive.

Maine DEP can provide you with a list of approved SIA providers. Call 207-287-2651, or mail a request to: 17 State House Station, Augusta, ME 04333. The list is also available on the Internet at ***www.maine.gov/dep/rwm/ust/siavendors.doc***

Fuel inventory control involves four essential steps:

1. **Take daily measurements** of fuel in the tank, fuel dispensed, and fuel delivered.
2. **Reconcile the daily measurements** to determine the daily variance.
3. **Calculate the monthly variance** to determine whether your monthly variance is within regulatory guidelines.
4. **Submit a month's worth of daily inventory data** once a year to an approved SIA provider.

Inventory control is probably the oldest form of fuel-storage leak detection. It is also an essential UST-system management practice. Inventory records reflect everything that happens to the fuel in your storage system between the fill cap and the dispenser meter, allowing you to identify leaks from many different components of the fuel-storage system. But the reliability of this information is only as good as the care you take in carrying out the inventory-control procedures.

WHAT DO YOU DO EACH DAY?

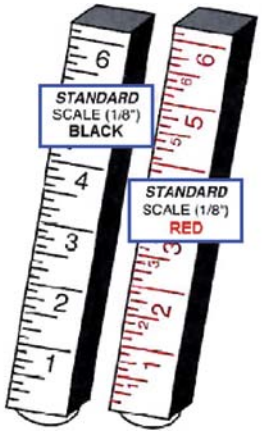
To perform daily inventory, there are four things you must keep track of on a daily basis:

- **The amount of fuel in the tank**
- **The amount of water in the tank**
- **The amount of fuel sold or dispensed**
- **The amount of fuel delivered**

Make separate inventory measurements for each product that you store. All of these measurements must be made at the same time, so that no dispensing or deliveries take place between the time when the volume dispensed and the volume in the tank are measured. You must make these measurements each day that fuel is added or removed from the storage system. You do not need to conduct inventory on days when your business is not open.

Make all your inventory measurements at the same time.

Measuring the Fuel in the Tank



The traditional way of measuring the amount of fuel in an underground tank is with a long wooden stick known as a gauge stick. For accurate measurements, the gauge stick must be straight and marked in 1/8-inch increments with clearly legible numbers.

To take a reading, lower the stick gently to the bottom of the tank and raise it quickly. Locate the line where the stick is wet and record the number of inches to the nearest 1/8 inch.

Use a tank chart to convert the depth measurement to gallons. Be sure you have the correct tank calibration with 1/8-inch increments that corresponds to your tank. Record the number of gallons on the inventory reconciliation report.

STICK READING	GALLONS
21-5/8"	586
21-3/4"	591
21-7/8"	596
22"	601
22-1/8"	606
22-1/4"	611
22-3/8"	616
22-1/2"	621

Tank charts may be available from the tank manufacturer. If you need assistance in determining how to contact the tank manufacturer, write or call the DEP at 17 State House Station, Augusta, ME 04333, 207-287-2651. Some tank charts can also be retrieved from the Internet:

For steel tanks:
http://gaugecharts.highlandtank.com:592/fmi/iwp/cgi?-db=HT%20Gauge%20Charts%20NEW&-loadframes

For fiberglass tanks manufactured by Xerxes:
www.xerxes.com/document-library/xerxes.html

For fiberglass tanks manufactured by Containment Solutions, Fluid Containment, and Owens Corning Fiberglas:
www.containmentsolutions.com/library/?sub=calibrationcharts&cat=field-services&class=LIT&rid=73

Tank charts may be available from the tank manufacturer.

Tank charts can also be constructed by your SIA vendor.

Tank charts can also be constructed by your SIA vendor. This is especially useful when unusual situations, such as a severely tilted tank, are encountered.

If you have an automatic tank gauge (ATG), you can get the gallon readings directly from the ATG display or printout. Check the operator's manual to find out how to get this information from your ATG.

Photos courtesy of Marcel Moreau Associates, Portland Maine.

If you use a gauge stick to measure inventory levels, be sure to measure carefully.

Gauge sticks should be clearly legible and in good condition. This stick is missing 5 inches from the bottom, but it was still in service when the picture was taken. This caused serious problems with the inventory records.

Measuring the Water in the Tank

The best way to measure water is to use water-finding paste that is applied to the bottom of a gauge stick. Almost all gasoline in Maine today contains ethanol, so be sure to use a water paste that is formulated for use with ethanol-blend gasoline. Follow the paste manufacturer's directions for using the water paste, paying particular attention to the amount of time the stick needs to stay in the tank and what color change indicates the presence of water.

The best way to measure water is to use water-finding paste that is applied to the bottom of a gauge stick.

Automatic tank gauges have water sensors but they should not be relied upon to detect water in tanks that contain gasoline blended with any amount of ethanol.

Courtesy of Marcel Moreau Associates, Portland Maine.

Check for water on a daily basis. Pastes from different manufacturers are different colors and will exhibit different color changes when they come in contact with water. Use the appropriate paste for the fuel you are storing and follow the manufacturer's instructions on how to use it.

Measuring Dispensed Fuel

The amount of fuel dispensed can be read from the totalizer meters located on your dispensers. Totalizers look and work just like your automobile odometer. They track the total amount of fuel that passes through your meter. Subtract the previous totalizer reading from the current reading to get the number of gallons pumped.

You may also get your sales volume from a point-of-sale system (computerized cash register) report that tells you how much of each grade of fuel you sold.

Whether you read totalizers or get reports from your point-of-sale system to determine the amount of fuel dispensed, it is important that the meters that measure the fuel be properly calibrated. Calibrating meters annually is recommended to maintain the accuracy of inventory records.

Recording the Amount of Fuel Delivered

You should receive a bill of lading or other form of delivery receipt from the fuel delivery driver. The bill of lading may indicate both a "net" and a "gross" volume. Use the gross volume as the number of gallons delivered for inventory record-keeping purposes. The net volume is corrected for temperature and should not be used for inventory record keeping.

Doing the Math

Once you have these three numbers (sales, tank inventory, and delivery volume), you must calculate the book inventory balance, the daily over or short (also known as the daily variance), and the cumulative over or short (also known as the cumulative variance). Refer to the Sample Inventory Report on the next page for detailed instructions on how to perform these calculations. You can make your job a lot easier and reduce math errors by developing a worksheet using computer software such as Microsoft® Excel to perform these calculations for you.

Your daily variance will rarely be zero because none of the measurements you are taking are exact. BUT your daily variance should not be too large either. If you have a large daily variance and it is not a math or measurement error, then PAY ATTENTION!!! Facilities have operated for months with losses of hundreds of gallons a day that were clearly indicated in their inventory records. Don't let this happen to you!

> **NOTE:** There are several methods of calculating inventory control that may be used to meet Maine regulatory requirements. The method presented here is the most commonly used, but other methods consistent with regulatory requirements are acceptable.

What If You Have a Blended Mid-Grade Fuel?

Normally, you would keep separate inventory records for each grade of fuel that you dispense. The exception to this is if you blend a mid-grade gasoline from your high- and low-grade products. If you have a blended mid-grade product, you may add together the sales, tank inventory, and delivery volumes for the high- and low-grade products and treat them as a single product for inventory purposes.

WHAT DO YOU DO AT THE END OF THE MONTH?

At the end of each month, you must check to see how large your variances for the month are relative to your sales volume. In Maine, your total variance at the end of the month (the cumulative variance) must be less than 1% of the amount of fuel dispensed during the course of the month. Refer to the Sample Inventory Report on the page 7 for detailed instructions on how to determine

At the end of each month you must check to see how large your variances for the month are relative to your sales volume.

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this. If the cumulative variance at the end of the month is more than 1% of your sales volume, this is evidence of a possible leak that must be reported to the DEP within 24 hours.

Another useful check is to count the number of positive and negative daily variances. Over a month's time, the number of positive daily variances should approximately equal the number of negative daily variances. If this is not true, something other than random error is likely to be influencing your inventory measurements. If you notice that the positive daily variances tend to be delivery days and the negative variances on non-delivery days (or vice versa) then the problem may be an incorrect tank chart, a stick that is missing a piece off the bottom, or a tank gauge that is not correctly calibrated. If you notice that the numbers in the cumulative variance column tend to grow larger as the month goes on, then you may have a leak or a meter that is not properly calibrated and is giving away fuel.

Report evidence of a possible leak to the DEP's Tanks Unit

207-287-2651

or call the 24-hour Spill Hotline

1-800-482-0777

WHAT DO YOU DO EACH YEAR?

To provide a check on the quality of your inventory data and to help identify problems that are hard to see in the raw data, Maine DEP rules require that once a year you send one month's worth of inventory data to a company that conducts an SIA and sends a report back to you. You must submit a copy of the SIA report to the DEP before July 1 of each year.

Your SIA results will indicate one of the following results:

- **Pass** – Your data quality is good and the inventory record does not indicate that a leak is present.
- **Inconclusive** – The data quality is not good enough to determine whether a leak is present. This result is most often due to careless measurements or taking measurements of gallons dispensed and closing tank inventory at different times.
- **Fail** – Your data indicate that a leak may be present. You have a problem that must be investigated! It may not be a leak but you must investigate it. This is also evidence of a possible leak that must be reported to the DEP within 24 hours. **DO NOT IGNORE A FAILED SIA RESULT!**

SAMPLE INVENTORY REPORT

This is a sample inventory record which should help you to understand how inventory information is recorded. The bold letters in the following paragraphs are keyed to the marked items on the sample inventory reconciliation report.

A. Opening Inventory is the actual gallons of product (closing stick inventory – column E) from the previous day. On the first of the month, this number is the closing stick inventory from the last day of the previous month.

B. Gallons Delivered should be recorded in this column each day product is delivered to the tank.

C. Gallons Pumped should be read and recorded each day from the meter readings on the tank's dispenser(s) or from your point of sale system. No fuel should be pumped between the time closing stick reading and the gallons pumped readings are made.

D. Book Inventory Balance is calculated not measured. It is equal to the Opening Inventory (A) plus the Gallons Delivered (B) minus the Gallons Pumped (C).

E. Closing Stick Inventory should be taken at approximately the same time every day. Read the height of the product on the stick to the nearest 1/8". Use a tank chart to convert the stick measurement to gallons and record the number of gallons.

F. Daily Over or Short is equal to the Closing Stick Inventory (E) minus the Book Inventory Balance (D).

G. Cumulative Over or Short is equal to the previous day cumulative over or short total (G) plus the daily over or short of the present day (F). This produces the over or short for the month to date. On the first of the month, the cumulative over or short is equal to the daily over or short.

H. Inches Water is the depth of any water in the bottom of the tank. It must be recorded each day, even if there is none. Apply water finding paste to the bottom inch or two of the gauge stick when measuring the closing stick inventory.

MONTHLY INVENTORY RECONCILIATION REPORT
Month / year February 2010

Facility & Location: Magi Oil, Ft. Kent — DEP Reg # 00000
Tank Size and Fuel Type: 6000 Super NL — Certified by: Tom Smith

Date	A Opening Inventory	B Gallons Delivered	C Gallons Pumped	D Book Inventory Balance	E Closing Stick Inventory	F Daily Over or Short	G Cumulative Over or Short	H Inches Water	I Initials
1	2556		143	2413	2441	28	28	0	TS
2	2441		227	2214	2118	-96	-68	0	ES
3	2118		259	1859	1955	96	28	0	ES
4	1955		225	1730	1733	3	31	0	TS
5	1733		372	1361	1270	-91	-60	0	ES
6	1270	2000	194	3076	3175	99	39	0	ES
7	3175		147	3028	3000	-28	11	0	ES
8	3000		164	2836	2843	7	18	0	TS
9	2843		406	2437	2320	-117	-99	0	TS
10	2320		361	1959	2053	94	-5	0	TS
11	2053		187	1866	1860	-6	-11	0	ES
12	1860		273	1587	1608	21	10	0	ES
13	1608		489	1119	1118	-1	9	0	ES
14	1118		97	1021	1000	-21	-12	0	TS
15	1000		132	868	835	-33	-45	0	TS
16	835		177	658	605	-53	-98	0	ES
17	605	3000	154	3451	3590	139	41	0	ES
18	3590		99	3491	3490	-1	40	0	ES
19	3490		292	3198	3210	12	52	0	TS
20	3210		477	2733	2711	-22	30	1/4"	TS
21	2711		25	2686	2711	25	55	1/4"	TS
22	2711		107	2604	2588	-16	39	1/4"	ES
23	2588		254	2334	2320	-14	25	1/4"	ES
24	2320		303	2017	2085	68	93	1/4"	ES
25	2085	2000	192	3893	3851	-42	51	1/4"	TS
26	3851		284	3567	3544	-23	28	1/4"	TS
27	3544		490	3054	3075	21	49	1/4"	TS
28	3075		166	2909	2898	-11	38	1/4"	TS
29									
30									
Math Check	J	K	L	M		N	O	P	
	2556 + 7000 - 6696 = 2860					2898 - 2860 = 38			

LEAK CHECK: Total Gallons Pumped **Q** 6696 X .01 = 66.96 **R** IF THE CUMULATIVE OVER OR SHORT AT THE END OF THE MONTH IS GREATER THAN THE LEAK CHECK RESULT, IT IS EVIDENCE OF A POSSIBLE LEAK AND YOU MUST NOTIFY MAINE DEP WITHIN 24 HOURS AT (207) 287-2651.

I. Enter the **Initials** of who entered today's information.

J. Math Check. Copy the **Opening Inventory** figure for the first day of the month in this box.

K. Enter the sum of **Gallons Delivered** for the month in this box.

L. Enter the sum of **Gallons Pumped** for the entire month in this box.

M. Take **Opening Inventory** (J), add **Gallons Delivered** (K), subtract **Total Gallons Pumped** (L) to get M.

N. Copy the **Closing Stick Inventory** from the last day of the month in this box.

O. Copy the answer from the **Math Check** (M) in this box.

P. Subtract (O) from (N) to get (P). The result (P) should be equal to the last number in the **Cumulative Over or Short** column (G). If the numbers are not the same, there is a math error somewhere on the page.

Q. Enter the **Total Gallons Pumped** (L). Multiply by .01 (move the decimal two places to the left) to determine the **Leak Check Result** (R).

R. Compare R and P. If **Cumulative Over or Short** (P) is greater than **Leak Check Result** (R), you have evidence of a possible leak and must notify DEP within 24 hours. If R is greater than P, then the tank passes the leak detection test for this month. If your **Cumulative Over or Short** is a negative number, treat it as a positive number for the purpose of this comparison. For example, -74 would become +74.

WHAT OTHER REQUIREMENTS ARE THERE?

- **You must keep your inventory records and SIA results for 3 years.**
- **You must also have a device called a drop tube installed in your fill pipe.** A drop tube is an aluminum sleeve that extends from the top of your fill pipe to near the bottom of the tank. Most gasoline tanks in Maine have drop tubes, but they are less common on diesel tanks. If you don't know whether you have a drop tube, ask your service technician to check whether one is present.

MONTHLY INVENTORY RECONCILIATION REPORT

Month / year _____

Facility & Location:_____ DEP Reg # _____

Tank Size and Fuel Type: _____ Certified by: _____

Date	Opening Inventory (closing stick from previous day)	Gallons Delivered	Gallons Pumped	Book Inventory Balance	Closing Stick Inventory	Daily over or <short>	Cumulative over or <short>	Inches Water	Initials
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									

Math Check - + =

LEAK CHECK: Total Gallons Pumped (_____) X .01 = _____ IF SUM OF "CUMULATIVE OVER OR SHORT" IS GREATER THAN LEAK CHECK RESULT, IT IS CONSIDERED EVIDENCE OF A POSSIBLE LEAK AND YOU MUST NOTIFY MAINE DEP AS SOON AS POSSIBLE AT (207) 287-7655.

AUTOMATIC TANK GAUGES (ATGs)

An ATG is an electronic device, typically located in the office or back room of an UST facility, whose basic function is to tell you what is going on inside your tank (e.g., fuel level, volume, and temperature; water level and volume; high and low fuel-level warnings). But, as with a computer, you can add other features to your ATG so that it can perform other useful functions, such as monitoring sensors in interstitial spaces in tanks and lines, monitoring pressurized piping, or communicating remotely by way of a modem.

An ATG is an electronic device, whose basic function is to tell you what is going on inside your tank.

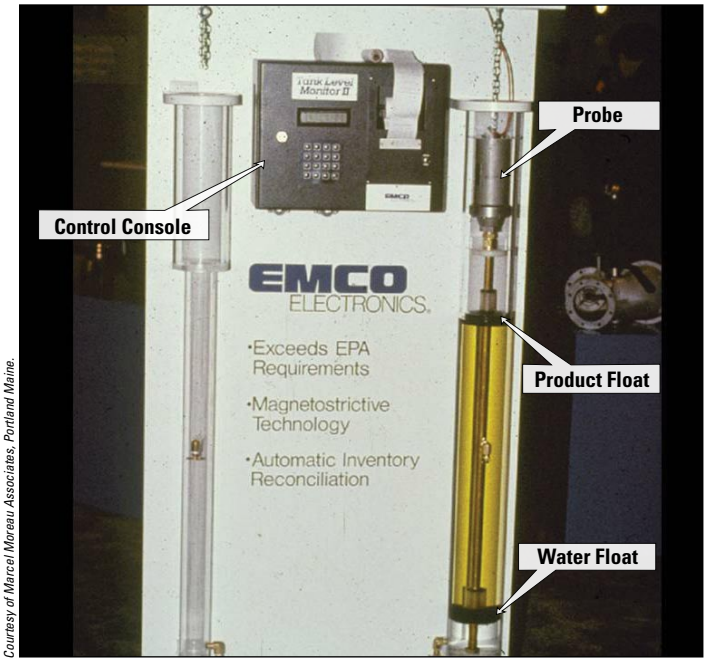
Common ATG consoles.

Photos courtesy of Marcel Moreau Associates, Portland Maine.

WHAT ARE THE COMPONENTS OF AN ATG?

An ATG uses probes located in each tank to measure fuel and water levels. Each probe consists of a long rod with two donut-shaped floats that slide along the rod. One float rests on the surface of the fuel, the other on any water that may be present in the bottom of the tank. The position of the floats tells the ATG console how much fuel and water are present in the tank. The probe rod also has thermistors to measure the fuel temperature.

A console is located inside the facility building, and includes a display, a keypad, a printer, status lights, and a beeper that signals alarm conditions.



Courtesy of Marcel Moreau Associates, Portland Maine.

ATG components.

HOW CAN AN ATG BE USED FOR LEAK DETECTION?

ATGs can be used to meet leak detection requirements in several ways:

- **Monitoring the fuel level in the tank.** This method of leak detection uses the basic ATG function of monitoring the fuel level over a period of time, when no fuel is added or removed from the tank, to see if the level is changing. This approach to leak detection is applicable to single-walled tanks only, and only if the ATG system has been registered with the DEP.
- **Monitoring pressurized piping.** This method of leak detection uses a special sensor that monitors the pressure inside the fuel-piping system between customer transactions, when the pressure should be stable. A loss of pressure in the piping may indicate a leak. The pressurized piping sensor (often called an electronic line leak detector) is an add-on device that plugs into the ATG console, just like a printer or scanner can be plugged into a computer. This approach to leak detection is applicable to single-walled pressurized piping only. (Regulatory requirements for monitoring pressurized piping as a method of leak detection are described in the *TankSmart* Piping: Pressurized Pumping Systems module.)
- **Monitoring sensors in interstitial spaces.** This method of leak detection uses liquid sensors that are installed in the interstitial spaces of double-walled tanks and piping. Like the pressurized-piping sensor, the interstitial sensor is an add-on device that plugs into the ATG console. This approach to leak detection is applicable to double-walled tanks and piping only. (Regulatory requirements for interstitial monitoring as a method of leak detection are described in the *TankSmart* double-walled tanks and piping modules.)

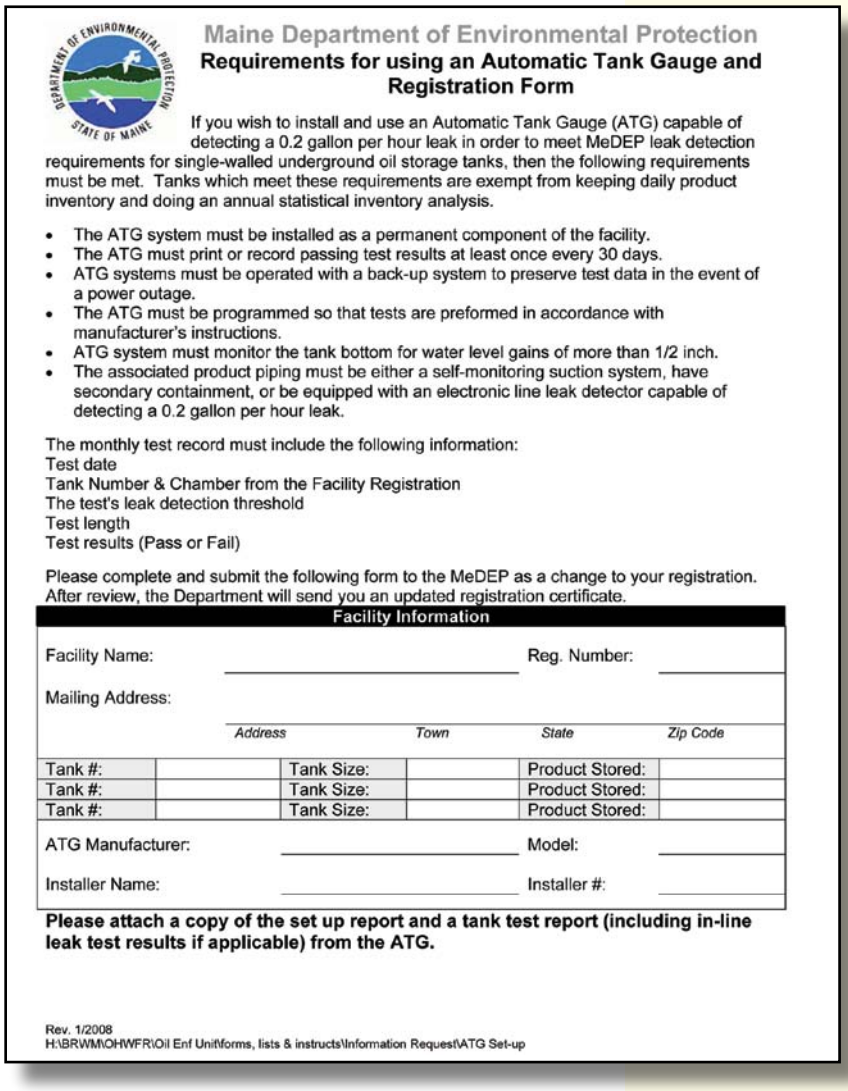
What Are the Requirements for Using an ATG as a Monthly Leak Detection Method with Single-Walled Storage Tanks?

To use an ATG for monthly leak detection with single-walled storage tanks, you must meet the following requirements:

- The ATG system must be installed as a permanent component of the facility.
- The ATG must print or record passing test results at least once every 30 days.
- The ATG must have a back-up system to preserve test data during a power outage.
- The ATG must be programmed so that tests are performed according to the manufacturer's instructions.
- The ATG system must monitor for water-level gains of more than 1/2 inch over an 8- to 12-hour period.
- The associated fuel piping must be one of the following:
  - a self-monitoring suction system
  - double-walled with interstitial monitoring
  - equipped with an electronic line leak detector.
- The DEP must receive and approve an ATG registration application.

To use an ATG for monthly leak detection with single-walled storage tanks, you must meet certain requirements.

In order for ATGs to be used for leak detection in single-walled tanks, this registration form must be received and approved by the DEP. To obtain this ATG registration form, visit www.maine.gov/dep/rwm/ust/index.htm or call 207-287-2651.



Maine Department of Environmental Protection

Requirements for using an Automatic Tank Gauge and Registration Form

If you wish to install and use an Automatic Tank Gauge (ATG) capable of detecting a 0.2 gallon per hour leak in order to meet MeDEP leak detection requirements for single-walled underground oil storage tanks, then the following requirements must be met. Tanks which meet these requirements are exempt from keeping daily product inventory and doing an annual statistical inventory analysis.

- The ATG system must be installed as a permanent component of the facility.
- The ATG must print or record passing test results at least once every 30 days.
- ATG systems must be operated with a back-up system to preserve test data in the event of a power outage.
- The ATG must be programmed so that tests are preformed in accordance with manufacturer's instructions.
- ATG system must monitor the tank bottom for water level gains of more than 1/2 inch.
- The associated product piping must be either a self-monitoring suction system, have secondary containment, or be equipped with an electronic line leak detector capable of detecting a 0.2 gallon per hour leak.

The monthly test record must include the following information:
Test date
Tank Number & Chamber from the Facility Registration
The test's leak detection threshold
Test length
Test results (Pass or Fail)

Please complete and submit the following form to the MeDEP as a change to your registration. After review, the Department will send you an updated registration certificate.

Facility Information

Facility Name: _____ Reg. Number: _____

Mailing Address: _____

Address *Town* *State* *Zip Code*

Tank #:		Tank Size:		Product Stored:	
Tank #:		Tank Size:		Product Stored:	
Tank #:		Tank Size:		Product Stored:	

ATG Manufacturer: _____ Model: _____

Installer Name: _____ Installer #: _____

Please attach a copy of the set up report and a tank test report (including in-line leak test results if applicable) from the ATG.

Rev. 1/2008
H:\BR\WM\OHWFR\Oil Enf Unit\forms, lists & instructs\Information Request\ATG Set-up

How Does an ATG Monthly Tank Test Work?

When using an ATG as your monthly tank-testing leak-detection method, your tank must PASS a test that can detect a 0.2 gallon-per-hour (gph) leak at least once every 30 days. A 0.2 gph leak rate is equivalent to about two cans of soda every hour. Detecting two cans of soda leaking onto your living room rug is pretty easy, but detecting two cans of soda leaking out of an 8,000- or 10,000-gallon tank by measuring the change in fuel volume requires very accurate measurements of fuel level and temperature.

Petroleum, especially gasoline, expands and contracts substantially with temperature, so you must monitor the fuel temperature very closely to get an accurate test. The temperature of fuel being delivered is most often different from the temperature of the fuel in the underground tank. Therefore, after a delivery, the fuel temperature inside a tank changes fairly rapidly, and you will not get good test results with a tank gauge for 6 to 12 hours after the delivery.

There are two types of ATG tank tests: periodic and continuous.

Periodic Test. The tank must be shut down for several hours, during which there should be no dispensing or delivery of fuel. Most periodic tests are done overnight. If the volume change is too great, the test fails. If product is dispensed in the middle of the test, the test usually fails. The periodic test approach is not applicable if your facility is open 24 hours a day.

Continuous Test. The ATG monitors the fuel level for periods of at least 15 to 20 minutes between customers, when a tank is idle. The ATG gathers and stores product-level data in its memory during these quiet intervals. If fuel dispensing starts, the data gathering is interrupted. The ATG then waits for another quiet period to gather more data. It keeps doing this until there is sufficient data to conclude that the tank is either tight or leaking.

WHAT IS THE BIGGEST PROBLEM WITH USING ATGs FOR LEAK DETECTION?

The single biggest problem associated with using ATGs for monthly release detection is:

OPERATORS IGNORING ALARMS!

Alarms are annoying for a reason—the ATG is trying to get your attention! Not all alarms are due to leaks, but ignoring any alarm defeats the purpose of having an ATG. Large leaks have gone undetected when operators either ignored an alarm or turned their ATG off to get rid of the annoying "beeping" sound. Respond immediately to any audible alarm or blinking red or yellow lights!

The single biggest problem associated with using ATGs for monthly release detection is: Operators ignoring alarms!

ATG Tank Test Procedure

How to read an ATG test report.

The ATG test report typically provides you with basic information about product volume and temperature in the tank at the beginning and end of the test. It also prints out the results of the test, usually "pass" or "fail." You may occasionally get an "inconclusive" result if conditions are not right for conducting a test over the testing period.

If the result is "pass," file the printout with your leak detection records and retain it onsite for 3 years.

If the result is "fail," you have evidence of a possible leak. You must **report this to the DEP within 24 hours** and investigate to figure out what happened.

If the result is "inconclusive," or you have a similar message indicating that a test was not successfully completed, you need to run another test. If you continue to get inconclusive test results, call your service technician to investigate and correct the problem.

What Are the Test Limitations for ATGs?

Be aware of the following ATG tank-test limitations:

- There must be a minimum amount of fuel in the tank for the ATG to get accurate data.
- The periodic type of ATG test is not valid for manifolded tanks. Tanks are manifolded if you have more than one tank with the same fuel in it, and the two tanks are connected so that the fuel levels in the tanks are about equal all the time. ATGs that perform periodic tests are NOT able to conduct valid tests on manifolded tanks unless a special valve is installed that separates the tanks for the duration of the test. ATGs that perform continuous tests ARE capable of testing this type of tank system.
- There is a limit to how large a tank or a set of manifolded tanks an ATG can test.
- For continuous tests, there is a limit on how much fuel you can pump over a period of a month and still have enough quiet time to perform a test.
- All ATGs must wait for a period of time after a delivery before conducting a leak test.

Be aware of ATG tank-test limitations.

How Do You Determine the Test Limitations for Your ATG?

To determine the test limitations for your ATG, you need the manufacturer's certification of performance, also known as the third-party evaluation. These documents are available from the ATG manufacturer, but are also available on the Web at ***www.nwglde.org*** or by calling the DEP at 207-287-2651 or your service technician for assistance. Keep the certification of performance for your particular ATG on hand so you know the limitations of your tank gauge.

OTHER USEFUL ATG FUNCTIONS

Besides release detection, other key information that an ATG can provide includes:

- **Ullage Volume Versus 90% Ullage.** Ullage is the amount of empty space left in the tank. For example, if you have an 8,000-gallon tank with 5,000 gallons of fuel in it, then the ullage volume is 3,000 gallons. Ninety percent ullage is the ullage minus 10% of the tank capacity. The 90% ullage volume is the amount of fuel that should fit in the tank without triggering the overfill-prevention device. The 90% ullage number can be used to determine the amount of fuel to order.
- **Gross Versus Net Volume.** Gasoline changes volume quite dramatically with temperature. For example, if you have 10,000 gallons of gasoline and it changes temperature by 1°F, the volume will change by 7 gallons. The gross volume is the actual volume of fuel at whatever temperature it happens to be. The net volume is the amount of fuel that WOULD be in the tank IF the temperature of the fuel were 60°F. The gross volume is the number to use for inventory control purposes.
- **Delivery Reports.** When a delivery occurs, the ATG automatically notes when the fuel level in a tank starts to rise and when it stops rising. The ATG then calculates the difference in volume and prints a report that gives you the volume of fuel delivered. The ATG delivery volume may not match the delivery invoice because any fuel dispensed while the delivery was in progress will not be included in the ATG delivery report.
- **Water Levels.** With traditional gasoline, the ATG reports the amount of water (in both inches and gallons) present in the bottom of the tank. An increase in water level of more than ½ inch over an 8- to 12-hour period must be reported to the DEP Tanks Unit immediately. (Call 207-287-2651.) However, water-level measurements from the ATG may not be accurate in ethanol fuels (even E10). Use a gauge stick and water-finding paste formulated for alcohol fuels to monitor for the presence of water when you are storing any blend of ethanol and gasoline.

If you have an ATG at your facility, it is essential that you know what it does or does not do for you, what it is telling you, and what to do when an alarm—sounds.

GET TO KNOW YOUR ATG

If you have an ATG at your facility, it is essential that you know what it does or does not do for you, what it is telling you, and what to do when an alarm—**any alarm**—sounds. There are many brands and models of ATGs; all have the ability to perform essentially the same functions. Insist that your ATG installer, inspector, or maintenance technician trains you and provides clear instructions on the proper operation and maintenance of the ATG. Contact the equipment manufacturer, your UST inspector, or your UST installer if you have questions about operating your ATG.

PIPING: DOUBLE-WALLED SYSTEMS

Double-walled piping systems consist of pipes within pipes and are designed to prevent releases into the environment by containing leaked fuel in the "interstitial space" created between the two walls of the pipe.

Double-walled piping systems consist of pipes within pipes and are designed to prevent releases into the environment.

There are two types of double-walled pipe:

- **Rigid piping** made of fiberglass-reinforced plastic (FRP).
- **Flexible piping**, typically constructed of multiple layers of various plastics.

Double-walled piping systems come in two categories:

- **Ducted pipe**, which has a large-diameter (4 inch) outer wall and a smaller-diameter (2 inch) inner pipe. If flexible piping is used to construct the ducted system, the inner pipe slides inside the outer pipe so the inner pipe can be removed and replaced without excavation.
- **Coaxial pipe**, which has an outer wall that fits snugly over the inner pipe. The two walls of coaxial pipe are manufactured together at the factory and installed as a unit. In some cases, coaxial pipe is installed within a larger-diameter duct to permit replacement of the coaxial pipe without excavation.

To be sure that all the fuel-carrying components of the piping system are contained, a double-walled piping system also includes liquid-tight containers known as "sumps" that are located beneath the dispensers (dispenser sumps) and where the piping connects to the pump at the tank top (tank-top sumps). Sumps are typically made of fiberglass or polyethylene plastic.

Underground storage system piping that does not routinely contain fuel (e.g., vent lines, fill pipes) is typically of single-walled construction, even for double-walled storage systems.

Since September 1991, double-walled piping has been required for all piping that routinely contains fuel, except for properly sloped suction systems (see *TankSmart* Piping: Suction Pumping Systems module). Leak detection for double-walled piping is known as interstitial monitoring. Since September 1991, sensors must be used to continuously monitor for leaks in interstitial spaces. Periodic visual inspection of sumps is not allowed for piping installed after September of 1991.

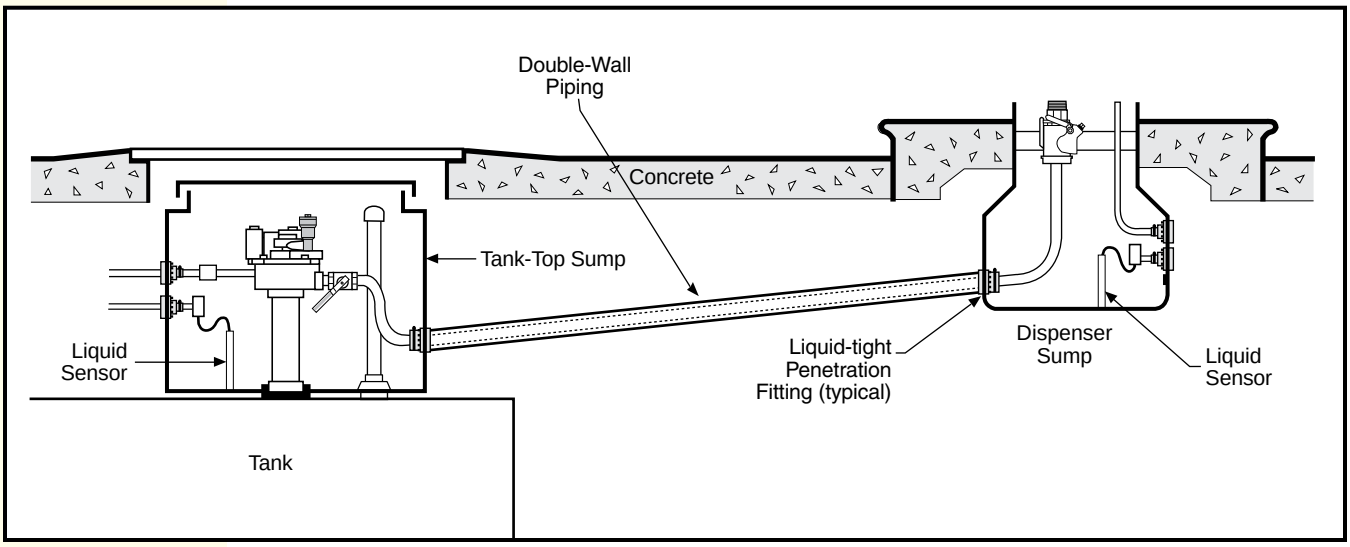


DIAGRAM OF A DOUBLE-WALLED PRESSURIZED PIPING SYSTEM. ***Any fuel leakage that occurs in the piping itself will flow down to the tank-top sump where the liquid sensor will trigger an alarm inside the facility. Leaks from piping components at the tank top are contained in the tank-top sump, while leaks from the dispenser are contained in the dispenser sump.***

HOW DOES INTERSTITIAL MONITORING DETECT LEAKS IN PIPING?

Interstitial monitoring is about detecting the presence of liquid in sumps with the use of sensors.

Interstitial monitoring is about detecting the presence of liquid in sumps with the use of sensors. In double-walled piping, the tank-top sump (the liquid-tight containment area on top of the tank) usually serves both as the low point for the piping run and the containment for the pump. A dispenser sump (the liquid-tight containment under the dispenser) captures and contains any leaks from inside the dispenser cabinet.

Most interstitial monitoring is conducted using sensors that are connected to an automatic tank gauge (ATG) that continuously monitors for leaks and also serves as an alarm console for the sensors. There are a few sensors on the market that are connected to a stand-alone release-detection console that has no other functions. In either case, sensors will trigger an alarm at the ATG or release-detection console whenever the sensor detects liquid.

There are two types of sensors: discriminating and non-discriminating. A discriminating sensor can tell the difference between fuel and water and provides a different alarm for each type of liquid. A non-discriminating sensor, by far the most commonly used, only tells you that a liquid is present. With non-discriminating sensors you have to visually investigate to determine whether fuel or water has triggered the alarm.

You should keep a list of all the sensor locations with the sensor identification number or label posted close to the ATG or release-detection monitor so you (and the service technician) can quickly tell which part of your piping system is causing the alarm.

Interstitial monitoring is the only release-detection method that can actually PREVENT a leak if the operator is paying attention to the alarms. The biggest issue with interstitial monitoring is:

OPERATORS NOT PAYING ATTENTION TO ALARMS!

Not all alarms are due to leaks, but ignoring any alarm defeats the purpose of having a leak-monitoring system. Large leaks have gone undetected when operators ignored an alarm. Most ATGs and leak consoles indicate alarms with audible beeping or a horn and an illuminated red light. Systems with digital displays also describe the alarm (e.g., L1: Fuel Alarm indicates liquid is present at the location where sensor L1 is installed). Respond immediately to any audible alarm or blinking red or yellow lights! If you do not know what to do, call your service technician or the Maine DEP.

The biggest issue with interstitial monitoring is: Operators not paying attention to alarms!

Other problems with interstitial monitoring include the following:

- Water gets into the tank-top sump, causing nuisance alarms. If you have frequent nuisance alarms due to water, consult with your service technician to figure out how to fix the problem.
- Sumps are not liquid tight, so leaks escape to the environment before the sensors detect them. Testing sumps periodically to be sure they are tight is not presently required by regulation, but is a good idea.

WHAT DO YOU DO IF YOUR ELECTRONIC MONITOR ALARMS?

If your ATG or release-detection console is in alarm, take the following steps:

- If the alarm is in a tank-top sump, stop pumping the grade of fuel where the alarm is located. If the alarm is in a dispenser sump, stop pumping all grades of fuel present in the dispenser.
- Contact your service technician immediately to determine the cause of the alarm.
- Report alarms, fuel, or water in sumps to the DEP within 24 hours. Call 207-287-2651 during business hours, or 1-800-482-0777 anytime.

To ensure your sensors are working properly and your sumps are in good condition, they must be inspected as part of your annual inspection by a Maine-certified tank installer or inspector.

WHAT DO YOU DO IF YOU HAVE MANUAL MONITORING?

In Maine, there are a small number of double-walled facilities that were installed **before September 1991** and are not required to have continuous electronic monitoring. If you have such a system, you are required to monitor your sumps manually, reconcile daily inventory, and conduct annual statistical inventory analysis (SIA). (See the *TankSmart* Daily Inventory & Statistical Inventory Analysis module.)

If you have double-walled piping without continuous electronic monitoring, you are required to monitor your sumps manually, reconcile daily inventory, and conduct annual statistical inventory analysis (SIA).

If you are manually monitoring your sumps, you are required to:

- Open each sump WEEKLY to visually inspect for fuel or water.
- Contact your service technician if you discover fluids in your sump.
- If you see a fuel leak, turn off the pump.
- Report the presence of fuel or water in a sump to the DEP within 24 hours.
- Maintain a log of weekly sump checks on site to document your leak detection activities.

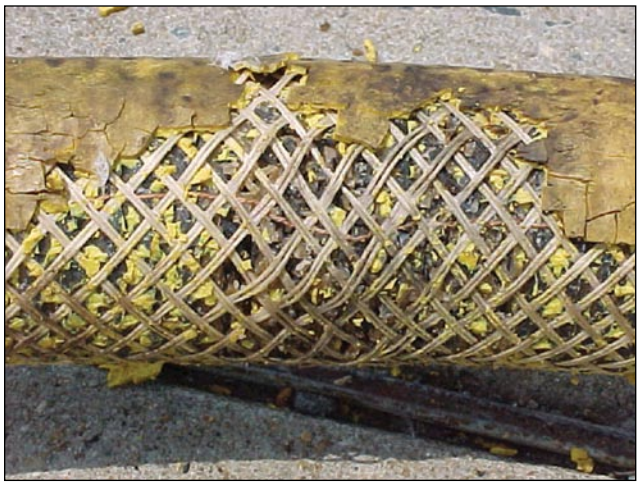
An automatic tank gauge in alarm.

A leak sensor in alarm.

A tank-top sump with water in it. The presence of water or fuel in a sump must be reported to the DEP within 24 hours of discovery. A qualified service technician should be called to diagnose the problem and properly dispose of whatever liquids are removed from sumps.

WHAT YOU SHOULD KNOW ABOUT FLEXIBLE PIPING

Some double-walled flexible piping sold in the 1990s has been found to severely deteriorate over time. Your certified installer/inspector will evaluate the condition of your piping during your annual inspection. If your piping is deteriorating, it will need to be repaired or replaced.



Courtesy of Ernest M. Roggelin, Pinellas CHD.

This flexible piping was bright yellow when it was installed, and the braiding that is visible was completely encased by the outer cover. Piping in this condition is severely degraded and may fail catastrophically at any time.

Courtesy of Ernest M. Roggelin, Pinellas CHD.

This flexible piping has "grown" in length, creating kinks in the pipe that can lead to a leak.

If your piping is deteriorating, it will need to be repaired or replaced.

PIPING: SINGLE-WALLED SYSTEMS

Today, most underground storage systems in Maine use double-walled piping to carry fuel from the tank to the dispenser. However, some older pressurized piping systems installed before September of 1991 still use single-walled piping, as do most suction pumping systems. Given that most UST-system releases today stem from the pressurized piping, double-walled pressurized piping provides a safety net to keep fuel out of the environment. With single-walled pressurized piping, you are walking a tightrope without a net—any leaks go straight into the ground. If you have single-walled pressurized piping, it is particularly crucial that you follow leak detection and monitoring requirements attentively.

With single-walled pressurized piping, you are walking a tightrope without a net—any leaks go straight into the ground.

What you need to do depends on the type of pumping system you have. If you have a suction pump, you should refer to the *TankSmart* Piping: Suction Pumping Systems module. If you have a pressurized piping system, refer to the *TankSmart* Piping: Pressurized Pumping Systems and the Daily Inventory and Statistical Inventory Analysis modules.

NOTE: Single-walled piping systems are made of either galvanized steel (old technology, subject to corrosion and leaky joints) or fiberglass-reinforced plastics (FRP). If you have steel single-walled piping, it must be cathodically protected to prevent corrosion. (See the *TankSmart* Cathodic Protection for Tanks & Piping module.)

With single-walled piping you must report all leaks to the DEP within 24 hours of discovery, no matter how small they may seem to be.

With single-walled piping you must report all leaks to the DEP within 24 hours of discovery, no matter how small they may seem to be.

Report evidence of a possible leak to the DEP's Tanks Unit

207-287-2651

or call the 24-hour Spill Hotline

1-800-482-0777

Single-walled piping systems are buried directly in the ground. Even very small leaks are released directly into the environment where they can cause significant contamination. If you have single-walled piping, you must carry out your leak detection responsibilities very conscientiously.

PIPING: PRESSURIZED PUMPING SYSTEMS

Pressurized pumping systems are the predominant fuel-pumping method used at today's retail motor-fuel operations. The pumping mechanism is located near the bottom of the underground tank, submerged in the fuel. The pump (known as a pressure pump or submerged turbine pump (STP)) moves the fuel through the piping under a pressure of about 30 pounds per square inch. One pump typically provides fuel to several nozzles.

In pressurized pumping system, the pumping mechanism is located near the bottom of the underground tank, submerged in the fuel.

Because the pumps are located inside the tank and operate under positive pressure, even large leaks in the piping do not affect the operation of the fuel-dispensing system and therefore often go unnoticed. (Just as with a garden hose, you can water your lawn perfectly well even if the hose has several leaks in it.) For this reason, leaks from pressurized pumping systems account for the majority of significant subsurface fuel releases.

Because of the environmental hazards they pose, pressurized pumping systems must have two types of release detection:

- one that finds big leaks (3 gallons per hour (gph)) within an hour, and
- one that finds smaller leaks (0.2 gph) within a month.

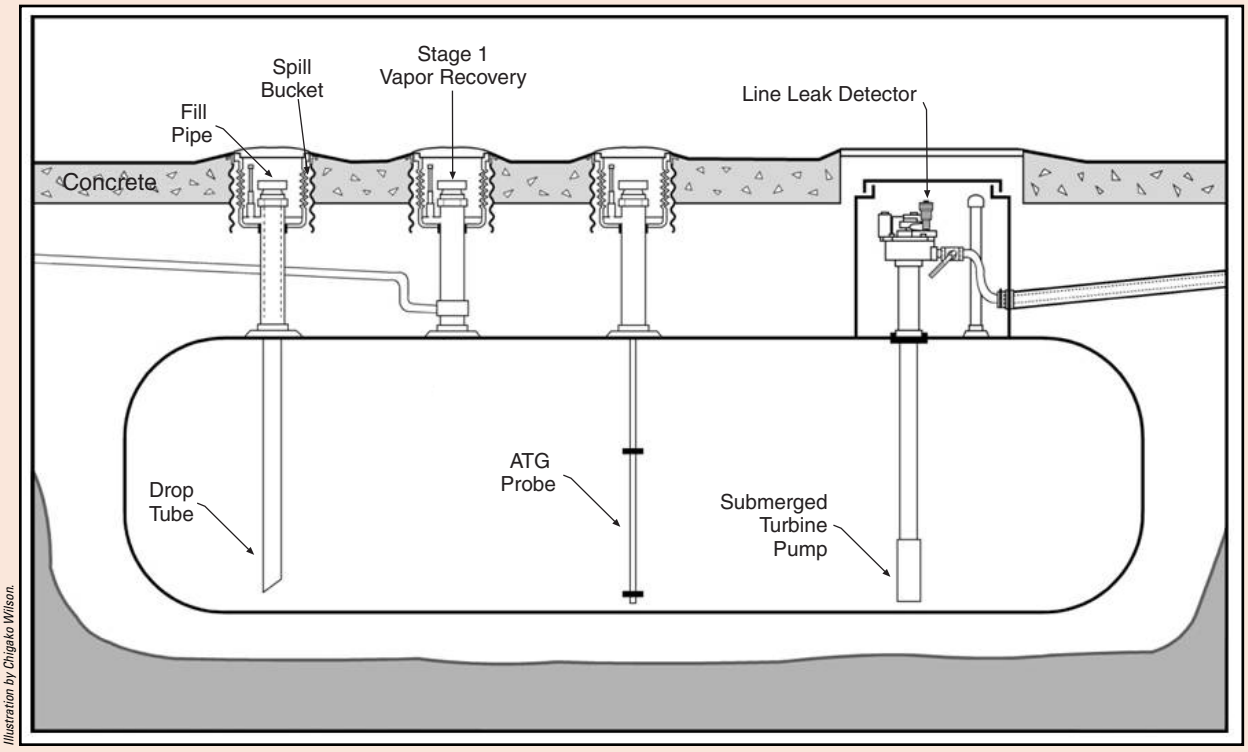


Illustration by Chigako Wilson.

DIAGRAM OF UST WITH DOUBLE-WALLED PRESSURIZED PUMPING SYSTEM. ***The pump that moves the fuel is located near the bottom of the tank. A single pump can supply fuel to several dispensers.***

HOW DO YOU FIND THE BIG LEAKS IN PRESSURIZED PIPING?

To find the big leaks in pressurized piping, you must use a device called a line leak detector (LLD). There are two types of LLDs: mechanical and electronic. It is important that you know which kind you have so that you can respond appropriately to indications of a leak. If you do not know what type you have, ask your service technician, certified installer, or certified inspector.

To find the big leaks in pressurized piping, you must use a device called a line leak detector (LLD)

Mechanical LLD – If you have a mechanical LLD, a leak will be indicated by a reduction in the flow of fuel (normal flow is 7 to 10 gpm, a leak is indicated by a flow of about 3 gpm).

If you have a mechanical LLD, you must respond immediately to customer complaints of slow fuel flow!!!

If you have a mechanical LLD, you should be aware of the following:

- Things other than leaks can cause slow flow (e.g., plugged filters, defective pump motors). You must call a service technician immediately to determine the cause. It could be a serious leak!
- Cold temperatures overnight may cause a mechanical LLD to go into slow flow first thing in the morning. If the slow flow only affects the first customer in the morning, it is likely because of temperature effects. If the slow flow persists after the first customer, call a service technician immediately.
- Mechanical LLDs wear out and typically need to be replaced every few years. They are tested as part of your annual inspection to verify that they are still working.

Electronic LLDs – If you have an electronic LLD, the LLD will shut down the pump when a big leak is detected. This is a much more reliable indicator of a problem than the slow flow that is the leak indicator for the mechanical line leak detector. Electronic LLDs are usually connected to an automatic tank gauge (ATG), though they may also be controlled by a separate console.

Both mechanical and electronic LLDs must be tested annually by a qualified technician as part of your annual inspection.

HOW DO YOU FIND THE SMALL LEAKS IN PRESSURIZED PIPING?

You have several options for finding smaller leaks (0.1 gph within a year) in your pressurized pumping system:

- For single-walled piping you can either:
  - Perform daily inventory and annual statistical inventory analysis (SIA). (See the *TankSmart* Daily Inventory & Statistical Inventory Analysis module.)
  - Install an electronic LLD that conducts a 0.2 gph test at least once every 30 days. You must keep documentation of the results of the test for at least 3 years.
- For double-walled piping you must have interstitial monitoring. (See the *TankSmart* Piping: Double-Walled Systems module.)

WHAT MUST YOU DO IF YOU THINK YOUR PIPING HAS A LEAK?

If you have a mechanical LLD and are experiencing slow flow that does not return to normal after the first customer of the day, OR if you have an electronic LLD and have a pump-shutdown event, you must do the following:

- **If you have a mechanical LLD, stop using the grade of fuel that is experiencing slow flow.**
- **Call a Certified Tank Installer immediately to investigate the problem.**
- **Call the DEP within 24 hours of suspecting a problem. Call 207-287-2651 during business hours or 1-800-482-0777 anytime.**

If you have a mechanical LLD and are experiencing slow flow, OR if you have an electronic LLD and have a pump-shutdown event, you must respond immediately.

WHAT ABOUT THOSE CRASH VALVES?

In pressurized pumping systems, crash valves are located at the base of the dispenser to prevent fuel releases should a vehicle crash into the dispenser or in case there is a fire inside the dispenser. Crash valves must be tested annually as part of your annual inspection. (See the *TankSmart* Dispensers module.)

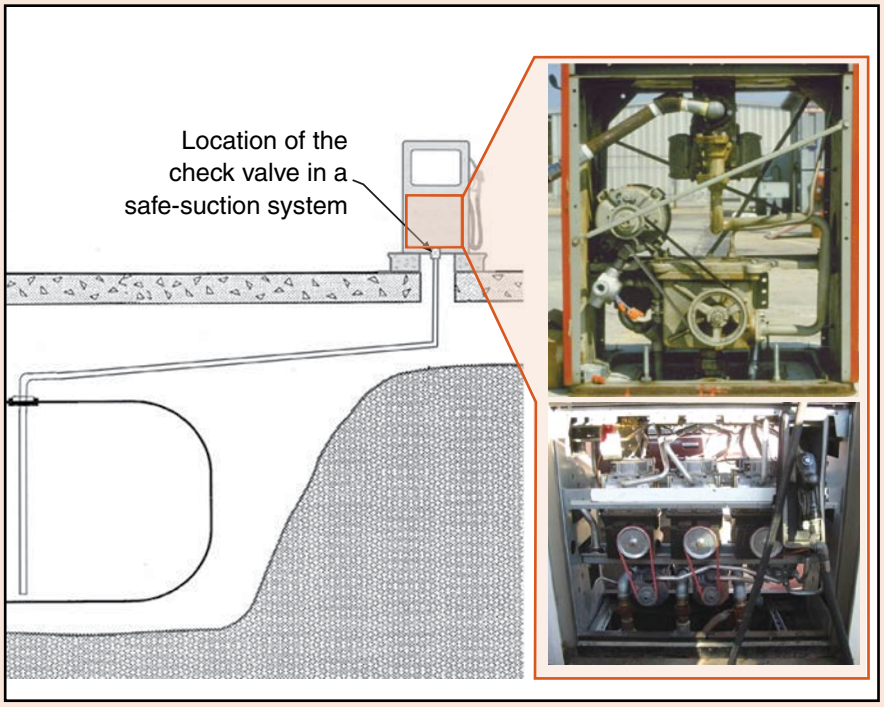
PIPING: SUCTION PUMPING SYSTEMS

In a suction pumping system, the pump is inside the dispenser cabinet, and the fuel is drawn from the tank by suction (like sucking liquid through a straw). It is relatively easy to tell when suction piping has a hole in it because the pump will not operate properly—try drinking through a straw with a hole in it.

In a suction pumping system, the pump is inside the dispenser cabinet, and the fuel is drawn from the tank by suction (like sucking liquid through a straw).

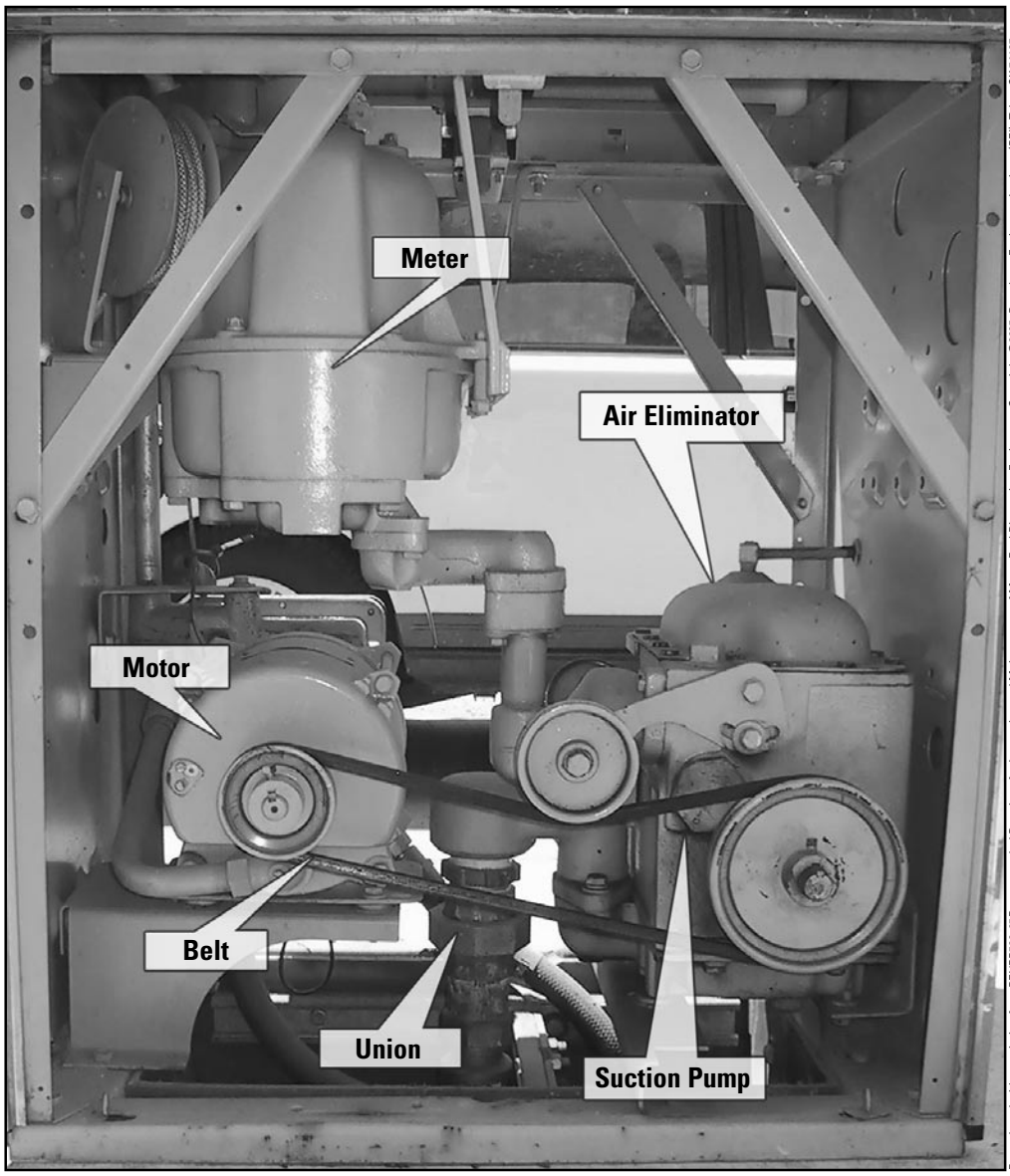
Fuel pumping systems have check valves that keep the piping full of liquid when the pump is turned off. The check valve opens whenever liquid is flowing toward the nozzle, and closes automatically whenever liquid tries to flow back toward the tank. It operates wherever it is located in the piping run—you can hold liquid in a straw by blocking the opening of the straw with either your finger at the bottom of the straw or your tongue at the top, or by squeezing the straw in the middle.

However, the location of the check valve in the fuel piping does make a difference with regard to leak detection. Maine suction-system regulations require the check valve to be located at the top of the piping, just below the suction pump. This is known as "safe" suction because if a hole develops in the piping, air will be drawn into the pipe and the fuel will fall back into the tank, but there will be no leakage to the environment. This type of installation is referred to as a "conforming" suction system, because it conforms to DEP regulations.



Photos courtesy of Marcel Moreau Associates, Portland Maine. Illustration by Chigako Wilson.

EXAMPLES OF SUCTION PUMPING SYSTEMS. ***You can always tell when you have a suction pump because there will be pulleys and a rubber belt inside the cabinet.***



All suction pumps contain the components identified in this picture, but the parts may differ in appearance and how they are arranged within the cabinet.

If the pump makes strange noises when it is first turned on and takes a little longer for fuel to come out of the nozzle—these are indications that you may have a leak.

HOW DO YOU KNOW IF YOUR SUCTION SYSTEM IS LEAKING?

If there is a hole in the piping, air will enter the pipe, the pump will make strange noises when it is first turned on, and it will take a little longer for fuel to come out of the nozzle. These are indications that you may have a leak. Call the DEP to report a suspected release and call your service technician right away to investigate the problem.

Even if you have safe-suction piping, any product above the check valve in the dispenser piping or the pump itself cannot drain back to the tank and could leak into the environment. It is a good idea to have a dispenser sump

underneath your suction pump to catch these kinds of leaks before they get into the environment. If you don't have a dispenser sump that is continuously monitored for leaks (see *TankSmart* Double-Walled Piping module), then you should remove the dispenser cabinet cover and look inside for signs of leaks on a monthly basis.

LEAK DETECTION FOR SUCTION PIPING

In terms of leak detection, safe-suction piping is as painless as leak detection gets. If you have safe suction, you should have documentation (usually from the installer) that states the following:

- There is only one check valve in the piping system and it is located immediately below the pump.
- The pump is higher than the tank and the piping slopes uniformly from the pump down to the tank.

NOTE: If you have a situation where the pump is lower than the tank (e.g., a marina or an aboveground tank) you can NOT use this safe-suction technique to meet your leak detection requirements. For information on your leak detection requirements:

- If your piping is double-walled, refer to the *TankSmart* Double-Walled Piping module.
- If your piping is single-walled, refer to the *TankSmart* Daily Inventory & Statistical Inventory Analysis module.

Report evidence of a possible leak to the DEP's Tanks Unit

207-287-2651

or call the 24-hour Spill Hotline

1-800-482-0777

In terms of leak detection, safe-suction piping is as painless as leak detection gets.

OVERFILL PREVENTION: BALL FLOATS

What is a fuel-delivery overfill? In a typical delivery, the tank on the truck is empty before the underground tank is completely full. If the underground tank is completely filled before the tank on the truck is empty, the driver will be stuck with a hose full of fuel. When your UST is full of fuel and the driver's hose is full of fuel that won't fit in the UST, the driver has an overfill situation.

When your UST is full of fuel and the driver's hose is full of fuel that won't fit in the UST, the driver has an overfill situation.

Courtesy of Marcel Moreau Associates, Portland Maine.

Fuel Delivery. ***The driver is preparing to make a fuel delivery. The yellow hose will carry vapors from the underground tank back into the truck. The red hose will carry fuel from the truck into the underground tank. The "elbow" fitting the driver is handling creates a liquid-tight seal with the tank fill pipe. The right end of the red hose will be connected to the valve fittings under the truck. Each valve connects to a separate fuel-carrying compartment in the tank truck. The valves have covers over them to prevent drips and keep the valve mechanism clean.***

What can the driver do? He has two options: wait for customers to buy enough fuel so the fuel in the hose will fit in the tank, or disconnect the hose and drain its contents into the spill bucket at the fill-pipe manhole, the most expedient option. However, if the spill bucket is not big enough to contain the remaining fuel, or if it is already full of water and/or dirt, then the fuel will spill into the environment, with the potential for soil and water contamination, not to mention a fire.

Fire codes say that delivery drivers should be standing right by their vehicles so they can pay attention to the delivery—not sitting inside the truck or inside a building. But, guess what? UST rules say that it is **YOUR** job to ensure a representative of the owner, operator, or oil transporter is physically present during fuel deliveries and monitoring all product deliveries or transfers in order to prevent overfills.

WHAT IS YOUR JOB IN PREVENTING DELIVERY OVERFILLS?

As the person who is legally responsible for ensuring that overfills do not happen during fuel deliveries at your UST facility, it is useful to have a written delivery procedure that you follow faithfully. This procedure should include the following measures:

- **Ensure there is enough room in the tank BEFORE each delivery.** Measure the fuel level in your tank(s) before each delivery. Know the "working" capacity of your tank(s). (The working capacity is the amount of fuel the tank will hold without triggering the overfill-prevention device.) If you have a tank gauge, order your fuel based on the 90% ullage reading from the tank gauge.
- **Monitor all fuel deliveries from beginning to end.** Delivery drivers tend to be a little more careful if someone is watching. If you have security cameras, focus one on your fuel-delivery area and let drivers know that they are on camera.
- **Inspect your spill buckets routinely.** If necessary, clean them before and after each product delivery (see the *TankSmart* Spill Buckets module).
- **Respond to ALL overfill indications.** In the case of a ball float, there is no indication that the ball float has closed other than that the delivery is taking longer than normal. In order to perceive this, someone, be it the delivery driver or you, needs to be monitoring the delivery.
- **Report, and clean up all spills.** Have spill cleanup materials handy for small spills, and for bigger spills, post emergency phone numbers in a prominent location so you can report the spill to the appropriate authorities.

Remember, you are the primary overfill-prevention device.

WHAT DO OVERFILL-PREVENTION DEVICES DO?

Overfill-prevention devices are essentially your **BACKUP** if you fail to order the right amount of fuel. Remember, you are the primary overfill-prevention device. The function of overfill-prevention devices is to stop or severely limit the flow of product into the tank **BEFORE** the tank is filled to the very top, so there is still room to fit the contents of the hose into the tank. There are three technologies for doing this:

- **Ball-float valves** (also known as float-vent valves)
- **Electronic alarms**
- **Drop-tube devices** (also known as automatic-shutoff or "flapper" valves)

This module addresses Ball-Float Valves.

Fuel Delivery Terms

Pumped delivery Fuel is pumped under substantial pressure from the truck to the tank. Most often the fuel flows through a long hose (hundreds of feet) stored on a reel on the truck. You receive a delivery ticket printed by a meter on the truck that shows an exact number of gallons delivered.

Gravity delivery Fuel flows under the influence of gravity from the truck to the tank. Most often the fuel flows through a short hose (10 to 20 feet long) that is connected and disconnected to the truck and the tank for each delivery. You receive a bill of lading printed at a terminal or bulk-storage plant that shows the number of gallons loaded onto the truck.

Tight fill The delivery hose is fastened to the fill-pipe opening using a delivery fitting that clamps onto the fill-pipe opening with a liquid-tight connection (see photo on page 1). Gasoline deliveries should be made using tight-fill connections.

Loose fill Delivery is accomplished by inserting a short length of pipe into the tank-fill opening, much the same way as a fueling nozzle is inserted into an automobile fill pipe.

This type of fuel delivery truck most often makes pumped deliveries.

This type of fuel delivery truck most often makes gravity deliveries.

Courtesy of Marcel Moreau Associates, Portland Maine.

BALL-FLOAT VALVES (FLOAT-VENT VALVES)

Ball floats consist of a short length of pipe that extends down into the top of the tank from the vent opening. Typically, a wire cage containing a hollow ball is fastened to the lower end of the pipe. The ball sits below the end of the pipe within the wire cage. As long as the product level is below that of the ball, the tank vent pipe remains open and the tank can breathe. If the fuel level is too high, the ball floats up and blocks the vent opening. With the vent blocked, very little fuel can flow into the tank. For a ball float valve to work, the delivery hose must be tightly clamped to the fill pipe. Otherwise, fuel will back up the fill pipe and spill out of the fill opening.

The rules say these devices **must be set to operate at 90% of full-tank volume.**

Courtesy of Marcel Moreau Associates, Portland Maine.

Ball-float device.

Ball floats consist of a short length of pipe that extends down into the top of the tank from the vent opening.

WHEN SHOULD BALL-FLOAT DEVICES NOT BE USED?

Ball-float devices are not user friendly. They increase the pressure in the tank so that fuel can splash back on the driver if he tries to disconnect any hoses. Drivers often relieve the pressure in the tank by either opening the drain in the spill bucket or removing the cap on the ATG riser. This releases flammable vapors and creates a serious explosion hazard. There are so many

Ball-float devices are not user friendly.

potential problems with ball-float devices that the Petroleum Equipment Institute recommends that ball-float valves NOT be used at all. (See PEI/RP100 *Recommended Practices for Installation of Underground Liquid Storage Systems.*) If you have ball-float overfill-prevention devices, be aware of the following situations that create extremely hazardous conditions:

DO NOT Use Ball-Float Devices...

- **On tanks that receive pressurized (pumped) deliveries.** The tank may become over pressurized, causing it to rupture. If the delivery is metered at the delivery truck, it is probably pressurized.
- **On tanks with remote fills and gauge openings.** Fuel may escape through the gauge opening if the tank is overfilled.
- **On tanks with suction pumps.** When the ball closes off the vent pipe, pressure builds in the tank and the fuel looks for an escape route—the pump. An overfill at the tank creates a fuel spill at the pump where your customers are. (See the *TankSmart* Piping: Suction Pumping Systems module.)
- **With loose fills.** If the delivery hose is not tightly clamped to the tank fill pipe, fuel will back up the fill pipe and spill onto the ground when the ball-float valve closes.
- **With coaxial Stage I vapor recovery.** In this situation the tank vents through the fill pipe, bypassing the regular vent. The ball-float valve is useless in preventing an overfill.
- **With generator or heating oil tanks.** These types of tanks very often have pumped deliveries and loose-fill connections, two things that are not compatible with ball-float valves.

Courtesy of Marcel Moreau Associates, Portland Maine.

A manway opening that blew open as a result of a pressurized delivery made to a tank equipped with a ball-float valve.

NOTE: Some tanks are equipped with both a ball-float valve and a drop-tube shutoff valve. Having both of these devices on the same tank is not necessarily better. Ball floats interfere with the operation of the drop-tube shutoff valve if the ball float operates first. If you feel you need two overfill devices, use a drop-tube shutoff valve in combination with an alarm, with the alarm set to operate at a lower level than the drop-tube device. Make sure you know what overfill device you have and at what level it is set to operate.

To ensure your overfill device is working properly, it must be tested annually during the annual inspection by a Maine-certified tank installer or inspector.

OVERFILL PREVENTION: ELECTRONIC ALARMS

What is a fuel-delivery overfill? In a typical delivery, the tank on the truck is empty before the underground tank is completely full. If the underground tank is completely filled before the tank on the truck is empty, the driver will be stuck with a hose full of fuel. When your UST is full of fuel and the driver's hose is full of fuel that won't fit in the UST, the driver has an overfill situation.

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Courtesy of Marcel Moreau Associates, Portland Maine.

Fuel Delivery. ***The driver is preparing to make a fuel delivery. The yellow hose will carry vapors from the underground tank back into the truck. The red hose will carry fuel from the truck into the underground tank. The "elbow" fitting the driver is handling creates a liquid-tight seal with the tank fill pipe. The right end of the red hose will be connected to the valve fittings under the truck. Each valve connects to a separate fuel-carrying compartment in the tank truck. The valves have covers over them to prevent drips and keep the valve mechanism clean.***

What can the driver do? He has two options: wait for customers to buy enough fuel so the fuel in the hose will fit in the tank, or disconnect the hose and drain its contents into the spill bucket at the fill-pipe manhole, the most expedient option. However, if the spill bucket is not big enough to contain the remaining fuel, or if it is already full of water and/or dirt, then the fuel will spill into the environment, with the potential for soil and water contamination, not to mention a fire.

Fire codes say that delivery drivers should be standing right by their vehicles so they can pay attention to the delivery—not sitting inside the truck or inside a building. But, guess what? UST rules say that it is **YOUR** job to ensure a representative of the owner, operator, or oil transporter is physically present during fuel deliveries and monitoring all product deliveries or transfers in order to prevent overfills.

WHAT IS YOUR JOB IN PREVENTING DELIVERY OVERFILLS?

As the person who is legally responsible for ensuring that overfills do not happen during fuel deliveries at your UST facility, it is useful to have a written delivery procedure that you follow faithfully. This procedure should include the following measures:

- **Ensure there is enough room in the tank BEFORE each delivery.** Measure the fuel level in your tank(s) BEFORE each delivery. Know the "working" capacity of your tank(s). (The working capacity is the amount of fuel the tank will hold without triggering the overfill-prevention device.) If you have a tank gauge, order your fuel based on the 90% ullage reading from the tank gauge.
- **Monitor all fuel deliveries from beginning to end.** Delivery drivers tend to be a little more careful if someone is watching. If you have security cameras, focus one on your fuel-delivery area and let drivers know that they are on camera.
- **Inspect your spill buckets routinely.** If necessary, clean before and after each product delivery (see the *TankSmart* Spill Buckets module).
- **Respond to ALL overfill indications.** If your tank gauge is alerting you to overfills, it means you have ordered too much fuel. Most alarms are set at 90% of the tank capacity, so when you have an overfill alarm it doesn't necessarily mean that you have had a spill, but you have come real close.
- **Report, and clean up all spills.** Have spill cleanup materials handy for small spills, and for bigger spills, post emergency phone numbers in a prominent location so you can report the spill to the appropriate authorities.

WHAT DO OVERFILL-PREVENTION DEVICES DO?

Remember, you are the primary overfill-prevention device.

Overfill prevention devices are essentially your **BACKUP** if you fail to order the right amount of fuel. Remember, you are the primary overfill-prevention device. The function of overfill-prevention devices is to stop or severely limit the flow of product into the tank **BEFORE** the tank is filled to the very top, so there is still room to fit the contents of the hose into the tank. There are three technologies for doing this:

- **Ball-float valves** (also known as float-vent valves)
- **Electronic alarms**
- **Drop-tube devices** (also known as automatic-shutoff or "flapper" valves)

This module addresses Electronic Alarm Systems.

Fuel Delivery Terms

Pumped delivery Fuel is pumped under substantial pressure from the truck to the tank. Most often the fuel flows through a long hose (hundreds of feet) stored on a reel on the truck. You receive a delivery ticket printed by a meter on the truck that shows an exact number of gallons delivered.

Gravity delivery Fuel flows under the influence of gravity from the truck to the tank. Most often the fuel flows through a short hose (10 to 20 feet long) that is connected and disconnected to the truck and the tank for each delivery. You receive a bill of lading printed at a terminal or bulk-storage plant that shows the number of gallons loaded onto the truck.

Tight fill The delivery hose is fastened to the fill-pipe opening using a delivery fitting that clamps onto the fill-pipe opening with a liquid-tight connection (see photo on page 1). Gasoline deliveries should be made using tight-fill connections.

Loose fill Delivery is accomplished by inserting a short length of pipe into the tank-fill opening, much the same way as a fueling nozzle is inserted into an automobile fill pipe.

This type of fuel delivery truck most often makes pumped deliveries.

This type of fuel delivery truck most often makes gravity deliveries.

Courtesy of Marcel Moreau Associates, Portland Maine.

ELECTRONIC ALARMS

Of the three available overfill-prevention technologies, electronic alarms are used the least, even though they are the most versatile. Alarms may be used with tanks that receive pumped or gravity deliveries and with tight- or loose-fill connections. A typical overfill alarm is tied into an automatic tank gauging (ATG) system. Most ATGs have the ability to trigger a remote alarm, which should be located outdoors near the fill area and clearly labeled so the driver knows what it is. The alarm is triggered when the tank is 90% full.

Alarms may be used with tanks that receive pumped or gravity deliveries and with tight- or loose-fill connections.

Courtesy of Marcel Moreau Associates, Portland Maine.

This is a typical unlabeled overfill alarm. These alarms should be labeled so the delivery driver knows where it is and what it is.

Courtesy of Marcel Moreau Associates, Portland Maine.

Here is a different type of overfill alarm that is labeled so the delivery driver knows that when it sounds, it is talking to him.

HOW DOES AN ELECTRONIC ALARM WORK?

As the underground tank is being filled, a float located inside the tank rises. When it reaches the trigger point, it closes a circuit and the alarm sounds. The fuel-delivery driver must be able to see and hear the alarm while filling the tank. When the driver hears the alarm, he should close the valve at the tanker and drain the delivery hose into the tank.

> **NOTE:** While it is NOT an overfill-prevention device by itself, your ATG will also likely sound a feeble (but annoying) beep when the outdoor alarm goes off.

If you want belt-and-suspenders protection, an alarm is a good backup for either drop-tube or ball-float overfill-prevention devices.

When an overfill alarm triggers often, do not ignore it. It means that there is something wrong with your delivery procedure. Perhaps the working capacity of your tank is less than you think it is. Call your service provider to verify your alarm setting(s) and the working capacity of your tank(s).

To ensure your overfill device is working properly, it must be tested annually during the annual inspection by a Maine-certified tank installer or inspector.

OVERFILL PREVENTION: DROP-TUBE SHUTOFF VALVES

What is a fuel-delivery overfill? In a typical delivery, the tank on the truck is empty before the underground tank is completely full. If the underground tank is completely filled before the tank on the truck is empty, the driver will be stuck with a hose full of fuel. When your UST is full of fuel and the driver's hose is full of fuel that won't fit in the UST, the driver has an overfill situation.

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Courtesy of Marcel Moreau Associates, Portland Maine.

Fuel Delivery. ***The driver is preparing to make a fuel delivery. The yellow hose will carry vapors from the underground tank back into the truck. The red hose will carry fuel from the truck into the underground tank. The "elbow" fitting the driver is handling creates a liquid-tight seal with the tank fill pipe. The right end of the red hose will be connected to the valve fittings under the truck. Each valve connects to a separate fuel-carrying compartment in the tank truck. The valves have covers over them to prevent drips and keep the valve mechanism clean.***

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- **Inspect your spill buckets routinely.** If necessary, clean before and after each product delivery (see the *TankSmart* Spill Buckets module).
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- **Ball-float valves** (also known as float-vent valves)
- **Electronic alarms**
- **Drop-tube devices** (also known as automatic-shutoff or "flapper" valves)

This module addresses Drop-Tube Shutoff Valves.

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Pumped delivery Fuel is pumped under substantial pressure from the truck to the tank. Most often the fuel flows through a long hose (hundreds of feet) stored on a reel on the truck. You receive a delivery ticket printed by a meter on the truck that shows an exact number of gallons delivered.

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This type of fuel delivery truck most often makes pumped deliveries.

This type of fuel delivery truck most often makes gravity deliveries.

Courtesy of Marcel Moreau Associates, Portland Maine.

DROP-TUBE SHUTOFF VALVE (also called Automatic-Shutoff or "Flapper" Valve)

Drop-tube shutoff valves replace a section of the drop tube, a thin aluminum tube located inside the tank fill pipe and extending close to the bottom of the tank. Typically, there is a float-activated mechanism on the outside of the tube that releases a valve, or flapper, inside the tube when the liquid level in the tank reaches 95% of full-tank volume. When this happens, the product flowing down the fill pipe slams the valve shut, severely restricting flow of fuel into the tank. The delivery hose "jumps," alerting the driver that the flapper has closed. At this point, the driver should stop the flow of fuel from the truck and drain any

Drop-tube valves replace a section of the drop tube, a thin aluminum tube located inside the tank fill pipe and extending close to the bottom of the tank.

Courtesy of Marcel Moreau Associates, Portland Maine.

Drop-tube shut-off valves are installed as part of the drop tube that fits inside the tank fill pipe. These valves must be inspected annually for proper operation.

fuel left in the hose into the tank. To notice the hose "jump," the delivery driver must watch the delivery hose, not sit inside his truck or inside a building.

After the main valve closes, a bypass valve allows a small amount of product to flow (5- to 10-gallons per minute) and the hose to be drained. If the delivery is allowed to continue (10 minutes or so after the main valve closes), the bypass valve also closes and the delivery hose can no longer be drained into the tank until the tank's liquid level is lowered.

Drop-tube shut-off valves are installed as part of the drop tube that fits inside the tank fill pipe. These valves must be inspected annually for proper operation.

Drop-tube shutoff valves work well as long as they are being used as intended and maintained properly.

ISSUES WITH DROP-TUBE OVERFILL-PREVENTION DEVICES

Drop-tube shutoff valves work well as long as they are being used as intended and maintained properly. Be aware of the following potential problems associated with drop-tube devices:

Courtesy of Marcel Moreau Associates, Portland Maine.

Gauge sticks in fill pipes prevent drop-tube shutoff valves from operating. They are illegal and can result in overfills.

- **Drop-tube shutoff valves have moving parts that can break.** To ensure your drop-tube device is working properly, it must be tested annually during the annual inspection by a Maine-certified tank installer or inspector.
- **Drop-tube devices must not be disabled or bypassed.** A gauge stick in a fill pipe (see photo) prevents the drop-tube shutoff valve from closing and may mean that the valve is closing prematurely. If you find a gauge stick in your fill pipe, call a service technician to check out your overfill valve.
- **The sudden closing of the drop-tube valve puts a great deal of stress on the delivery system.** The hose connections to the tank and truck must be secure, or they may pop off, creating a significant surface spill.
- **There must be a tight-fill connection between the tank and the delivery hose.**
- **Deliveries must be made by gravity only.** If a delivery is made under pressure (pumped) and the device activates, something is likely to break.

To ensure your overfill device is working properly, it must be tested annually during the annual inspection by a Maine-certified tank installer or inspector.

SPILL BUCKETS

A spill bucket is a liquid-tight container that surrounds the fill pipe. It is there to catch and contain any small leaks, drips, and spills from the delivery hose that may occur during the fuel delivery process. Small drips that occur when the hose is disconnected are common. Leaky hose connections are less common but can produce significant releases that spill buckets must be able to hold. Most spill buckets are below grade, but there are some that are located above grade as well. In Maine, spill buckets installed after April 5, 1986, must hold at least 3 gallons of liquid. Spill buckets installed after April 28, 2004, must be able to hold 15 gallons of liquid.

A spill bucket is a liquid-tight container that surrounds the fill pipe.

Delivery hose hooked to the fill pipe in the spill bucket.

Above-grade spill buckets.

Photos courtesy of Marcel Moreau Associates, Portland Maine.

Below-grade spill bucket.

This spill bucket needs cleaning. Keeping spill buckets clean is a constant chore.

MAINTENANCE

It is **YOUR** job to keep spill buckets **CLEAN** and **DRY** at all times. Water and/or fuel sitting in spill buckets will damage the buckets over time, causing them to rot or rust out. Chipped spill-bucket lids allow water to enter the bucket, and cracks or holes in the bucket itself allow fuel to leak out. Damaged lids or buckets must be replaced. During tank removals, contamination is often found around spill buckets that were defective and not replaced in a timely manner.

To maintain your spill buckets you must:

- Check your spill buckets after each delivery. Keep them free of oil, water, and debris.
  - Fuel in a clean bucket can be returned to the tank.
  - Dirty fuel or fuel and water mixtures must be treated as **hazardous waste** and disposed of properly.

Courtesy of Marcel Moreau Associates, Portland Maine.

- Check your spill buckets after rainstorms.
  - Water in the spill bucket must be treated as **hazardous waste** and disposed of properly. Contact your UST service provider for help in properly disposing of this water. Also, if water in the spill bucket is a frequent problem, consult with the UST service provider about what can be done to prevent this problem.

Water in spill buckets is most often contaminated and must be disposed of properly. Contact your UST service provider to be sure it is done properly.

PROBLEMS WITH SPILL BUCKETS

Tank owners/operators tend to overlook spill buckets. In fact, most operators don't know they have a leaky spill bucket until they have a cleanup on their hands. Given their exposure to weather extremes, spill buckets have relatively short lives—often less than 10 years. Once they are no longer liquid tight, they are no good. It is essential that you pay attention to the condition of your spill bucket. Be aware of the following potential problems:

- Chips in the lid that allow water to enter the bucket
- Accumulation of water as well as product (either can get you a citation from a regulator)
- Drain valve malfunctioning or broken

NOTE: With the prevalence of ethanol in fuels, drain valves can allow water into your tank, causing the alcohol to separate out of the gas, which can cause a pile of trouble in your customers' cars. If you have drain valves, it is a good idea to ask your service technician to replace them with liquid-tight plugs.

- Cracks or holes in the spill-bucket walls. Not all cracks and holes in spill buckets are obvious. If you have any doubt about the tightness of your spill buckets, have a qualified service technician test them for leaks.

If you do have to replace a spill bucket, consider installing a double-walled version. They are more expensive to buy, but the inner bucket can be replaced without breaking concrete, which will save you lots of money down the road. Also, you can easily tell if the spill bucket is leaking by checking the space between the two walls of the spill bucket.

It is essential that you pay attention to the condition of your spill bucket.

CATHODIC PROTECTION for TANKS & PIPING

Unless protective measures are taken, buried steel storage tanks, piping, and other metallic components of fuel storage systems corrode (rust) and leak product into the environment. Corrosion can attack the metal either over the entire surface of the metal (uniform corrosion) or in a small, localized area, creating a hole. Localized corrosion can perforate an unprotected tank in about 15 years and is the most common form of corrosion.

Unless protective measures are taken, buried steel storage tanks, piping, and other metallic components of fuel storage systems corrode (rust) and leak product into the environment.

For corrosion to occur, four components must always be present: an electrolyte (water), an anode (a place on the metal where corrosion happens), a cathode (a place on the metal where corrosion does NOT happen), and an electrical pathway (usually the metal components of the storage system itself) between the anode and cathode. Corrosion always involves electricity—the movement of electrons from the anode to the cathode. This is handy because there are instruments that measure the movement of electrons (e.g., voltmeters and ammeters) that can tell us things about corrosion.

Steel underground storage system components must be protected against corrosion failure. This can be accomplished by using non-metallic components such as fiberglass, by coating the metal to isolate it from the electrolyte, or by using a technique called cathodic protection (CP). If properly installed and maintained, CP can prevent corrosion on the outside surfaces of steel tanks, piping, and other metallic storage-system components. It is the UST operator's job to ensure that the CP system is properly maintained so that the UST system remains protected from corrosion.

CP only protects the outside surface of the metal that is in contact with the soil. It does not protect the inside surfaces. For this reason it is very important to keep all water out of steel tanks. Water is an electrolyte and will promote corrosion. Petroleum products are not electrolytes, so corrosion on the inside of tanks is not a problem as long as there is NO WATER present.

Courtesy of Marcel Moreau Associates, Portland Maine.

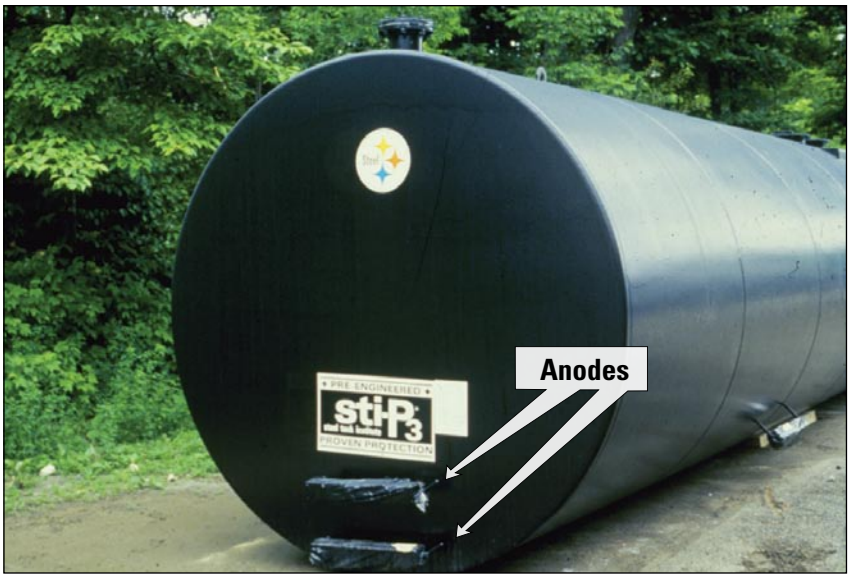
Corrosion on buried metal is often concentrated in very small areas. The result is perforations in the metal that resemble bullet holes.

HOW DOES CATHODIC PROTECTION PREVENT CORROSION?

One of the four elements necessary for corrosion to occur is a cathode—a place where metal does not corrode.

Remember that one of the four elements necessary for corrosion to occur is a cathode—a place where metal does not corrode. To combat corrosion with cathodic protection, we must set up a situation where the tank and/or its piping become a cathode. This is accomplished by creating a flow of electrons onto the surface of the metal. The corrosion then happens at the place that is producing the electrons (the anode). The anode will deteriorate over time and will need to be replaced, but as long as the anode is providing enough electrons, your tank and/or piping will be a cathode and will not corrode. There are two techniques for creating this flow of electrons from the anode to the cathode: galvanic CP and impressed current CP.

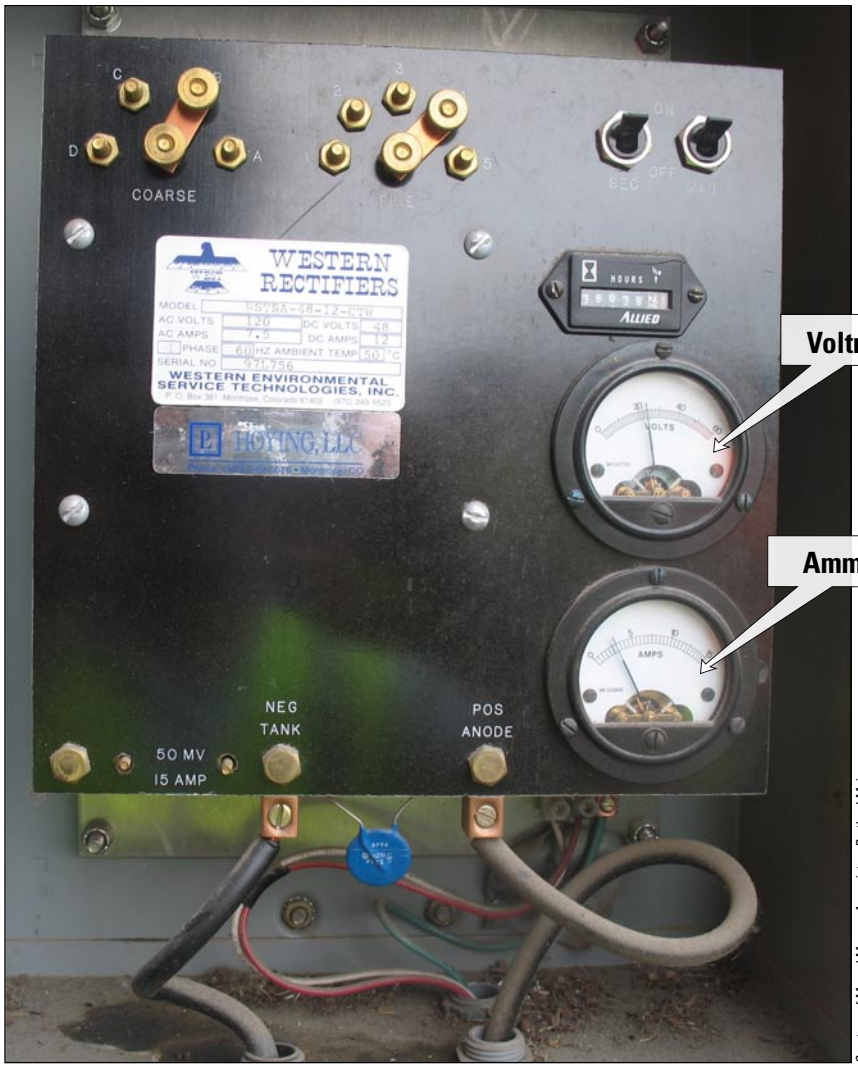
Galvanic CP uses simple chemistry, much like a flashlight battery, to produce the flow of electrons. The anode is typically a piece of zinc or magnesium that is buried in the ground and connected to the tank or pipe using a copper wire as the electrical pathway. If you own a boat, you are probably familiar with galvanic CP because zinc anodes are often used to protect outboard motors, propellers, and other underwater metal components of boats. Most of the CP systems in Maine are galvanic systems.



Courtesy of Marcel Moreau Associates, Portland Maine.

Zinc anodes attached to steel tanks are often used to provide protection against corrosion. The anodes in this picture are covered with plastic to protect them during manufacturing and shipping. The plastic will be removed when the tank is installed.

Impressed current CP uses standard 110-volt electricity from the power grid, just like the electricity that powers household lights and motors. The alternating current electricity from the power grid is first converted to direct current (like that from a battery) using a device called a rectifier. The direct current from the rectifier powers buried anodes that provide the electrons to protect the storage system.



Courtesy of Marcel Moreau Associates, Portland Maine.

Most rectifiers are equipped with voltmeters and ammeters that provide a simple means of determining whether the rectifier and the CP system are operating properly. Keeping a monthly log of the meter readings is an important responsibility for UST operators who have impressed current systems.

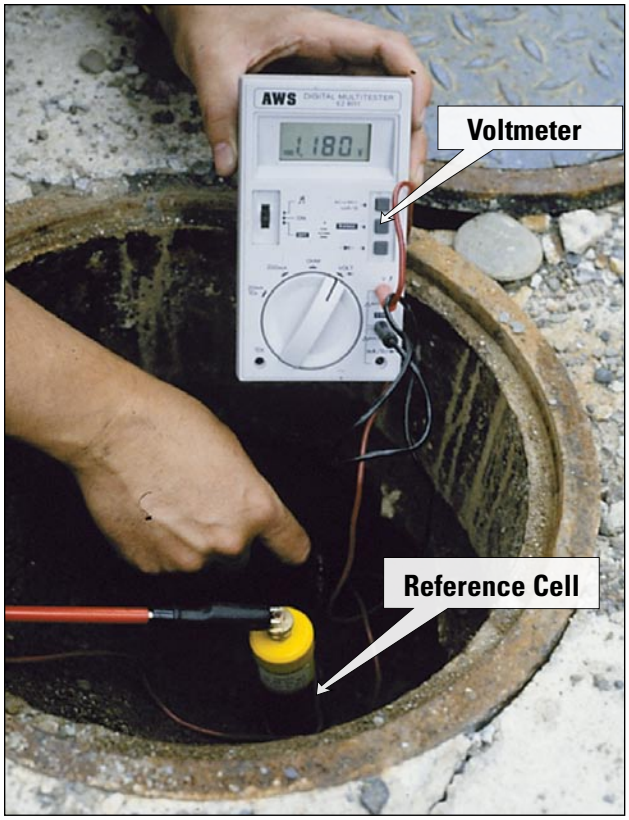
HOW DO YOU KNOW IF YOUR CP SYSTEM IS WORKING?

Because anodes are designed to wear out over time, it is important to be able to tell when it is time to replace them. Fortunately, determining whether a CP system is working is relatively easy to do. It does not require any excavation, just a few specialized tools—a reference cell and a voltmeter.

The reference cell is a copper rod inside a special container that is placed on clean soil at ground level (not on concrete or asphalt). The voltmeter reads the voltage between the reference cell and the buried tank or piping. The voltage readings are usually negative, and a reading more negative than -0.85 volts is the standard for steel to be adequately protected against corrosion. For impressed current systems, the rectifier must be turned off to make this measurement.

Because anodes are designed to wear out over time, it is important to be able to tell when it is time to replace them.

This type of voltage measurement, often called a structure-to-soil potential, is required for both galvanic and impressed current CP systems and must be repeated each year. The measurements must be made by a Maine-certified tank installer or a tank inspector with special certification to test CP systems. This CP test is often included as part of your annual inspection. You must keep the test report that documents these measurements on file for at least 3 years.



Courtesy of Marcel Moreau Associates, Portland Maine.

Measuring structure-to-soil potential is a relatively simple process, but it requires specialized tools and must be done by a qualified person.

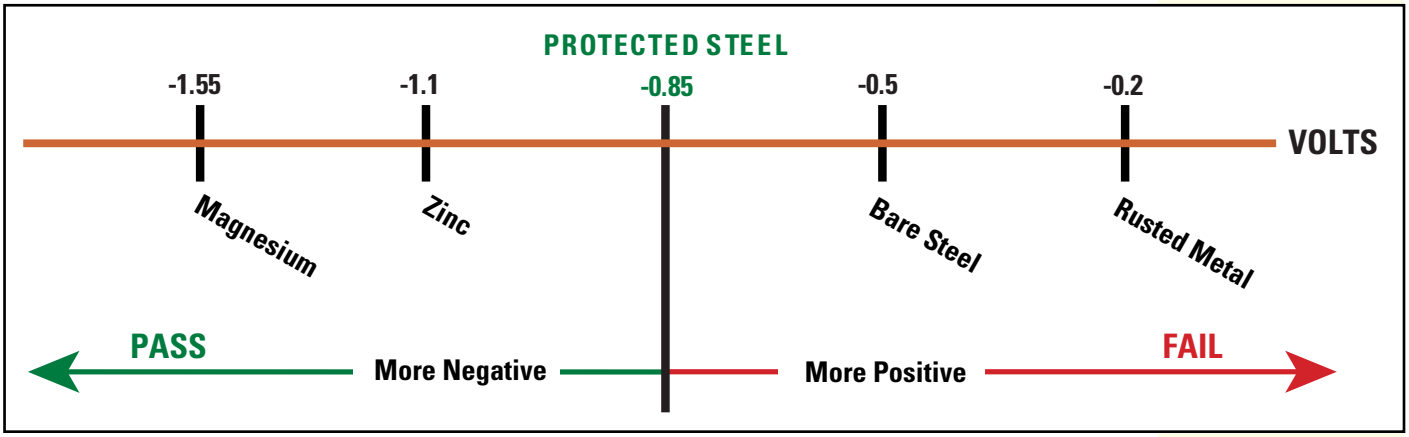
IS THERE ANYTHING ELSE YOU MUST DO TO MONITOR YOUR CP SYSTEM?

If you have a galvanic CP system, making sure that you have adequate structure-to-soil potential readings each year is all you have to do.

If you have an impressed current system, you must have adequate structure-to-soil potential readings each year AND you must also check the status of the rectifier at least once a month. As an UST operator you can do this monthly reading yourself. Most rectifiers include meters that give you the voltage and amperage being produced by the rectifier. Each month, you simply write down the voltage and amperage numbers in a log that records the date, voltage reading, amperage reading, and your initials. You must keep this log sheet on file for at least 3 years after the last reading.

What should the rectifier readings be? The voltage and amperage readings on the rectifier will be different for each facility that has impressed current CP. The actual numbers are not important. It is important that the numbers do not change much over time. If the voltage or amperage readings change more than about 10% from what they were when the CP system was first installed, then it is likely that something has affected the system, and it needs to be checked out. The corrosion engineer who designed the system should be notified of the change immediately. If you need help locating a corrosion engineer, call the DEP at 207-287-2651 and ask to speak to someone in the Tanks Unit.

The rectifier voltage and amperage readings should not change much over time. Significant changes in the readings mean that the system must be checked out.



Steel is protected from corrosion when it has a voltage more negative than -0.85 volts when measured with a reference cell (e.g., a reading of -0.88 indicates that a tank is protected. A reading of -0.83 indicates that a tank is NOT protected and the CP system must be repaired.)

Voltage readings more positive than -0.85 (e.g., -0.84, -0.80) are FAILING tests.

Cathodic protection can only be tested by a:
Certified Tank Installer
or
Certified Tank Inspector
approved as a CP Tester

For a list of Certified Tank Installers and Inspectors, visit the DEP's website at:
www.maine.gov/dep/rwm/ust/formslists.htm

WHAT DO YOU DO IF YOUR CP FAILS THE TEST?

If you have failed readings, you must do the following:

- **First Failed Test** – Your CP tester should conduct some trouble-shooting procedures. These include being sure that the ground is thawed and moist and checking the electrical isolation and continuity of the CP system components. The CP tester should also know how to conduct tests to determine whether adding galvanic anodes will fix the problem or whether you should consider switching to an impressed current system. The CP tester may need to return with additional equipment to conduct these tests.
- **Second Failed Test** – Unless the problem is frozen soil, you should have your CP system retested within a week or two of the first test. If readings are still not passing, you must have your CP system repaired or remove the tank or piping.
- If repairs are required, have your CP system repaired as soon as possible, but no more than 180 days after the first failed test. If you cannot complete your annual inspection within the required timeframe because of delays in getting your CP system working, notify the DEP to let them know what is happening. Call the DEP Tanks Unit at 207-287-2651.
- You cannot avoid having your CP system repaired by taking the storage system out of service. Rules require that metallic components of storage systems be protected from corrosion as long as they are in the ground, whether or not they are actually being used.

Conditions that Affect Structure-to-Soil Voltage

Age – Anodes get used up over time. Low voltage readings may indicate that anodes need to be replaced.

Weather – Dry or frozen soil can cause low voltage readings. Schedule your annual inspection for the spring when soil is thawed and more likely to be wet.

Lack of Isolation – Other metal in contact with your tank or piping or electrical currents from large power sources (e.g., an arc welder) near the tank system can disrupt the electrical flow of the CP system and leave your tank or piping unprotected.

STAGE I VAPOR RECOVERY

It used to be that when gasoline was delivered into your underground tank, gasoline vapors from the tank were discharged through the tank vent pipe into the atmosphere. Nowadays a technique known as Stage I vapor recovery is used at many facilities to capture these vapors. With Stage I vapor recovery, liquid gasoline flows through one hose from the truck to the underground tank, while at the same time, vapors from the tank flow upward through another hose to the tank truck. Liquid gasoline in the truck and the gasoline vapors in the underground tank are essentially trading places. When the tank truck takes on another load of fuel, the vapors in the truck are transferred to the fuel-storage facility. Keeping these vapors out of the atmosphere cuts down on air pollution.

With Stage I vapor recovery, liquid gasoline flows through one hose from the truck to the underground tank, while at the same time, vapors from the tank flow upward through another hose to the tank truck.

One of your responsibilities as an operator of a gasoline UST in Maine is to maintain a log of the total amount of gasoline you dispense each month (see an example of a log form on page 2). The amount of gasoline that you dispense determines the vapor-recovery measures that you need to use at your facility. This log must be kept at the facility, and you will need to show it to the person who does your annual inspection.

In Maine, Stage I vapor recovery must be used if the total amount of all grades of gasoline dispensed is greater than 10,000 gallons in any one month. Most retail fueling stations in Maine meet this throughput level and have had Stage I vapor recovery installed for many years.

In January 2008, the U.S. Environmental Protection Agency adopted Stage I vapor-recovery requirements for gasoline distribution facilities. Maine DEP is in the process of reviewing and modifying its rules to be consistent with the federal rules. Maine's Stage I requirements are the same or stricter than the new federal rules, except for stations with throughputs of over 100,000 gallons per month. If your facility has a throughput of more than 100,000 gallons per month, you will need to meet both federal and state requirements. If your facility has a throughput of 100,000 gallons or less per month, complying with the Maine requirements meets the federal requirements.

By January 10, 2011, facilities in Maine with gasoline throughputs greater than 100,000 gallons per month will be required to have hardware in place (e.g., pressure/vacuum vent caps, swivel fill and vapor adaptors, tightly sealed fill caps) to meet new federal performance requirements. In addition, testing will need to be conducted to demonstrate that the new federal performance requirements are being met and that very few vapors are escaping from the storage system.

A summary of the January 2008 federal regulations concerning Stage I vapor recovery is available online at: ***www.epa.gov/ttn/atw/area/gdfb.pdf.***

If you have questions about Stage 1 vapor recovery, call the DEP's Air Bureau at

207-287-2437

One of your responsibilities as an operator of a gasoline UST in Maine is to maintain a log of the total amount of gasoline you dispense each month

MONTHLY GASOLINE THROUGHPUT LOG

Facility: _____ **Registration Number:** _____

Location: _____

Gallons Pumped From Each Tank

20_____	Tank #	Tank #	Tank #	Tank #	Tank #	Tank #	Monthly Total
January							
February							
March							
April							
May							
June							
July							
August							
September							
October							
November							
December							
						Annual Total	

Department of Environmental Protection Regulation 118 "Gasoline Service Station Vapor Control", administered by the Bureau of Air Quality Control, requires all gasoline dispensing facilities to keep records of the amount of gasoline that is dispensed each month. These records must be available for inspection and copies provided to Department staff upon request.

To calculate the monthly volume of gasoline dispensed at the Station, fill in the **Gallons Pumped** for each gasoline tank for the appropriate month. Add the monthly gallons pumped for all gasoline tanks at the station and write this sum in the **Monthly Total** box. At the end of the year, add the monthly totals and place this sum in the **Annual Total** box.

Do not include the volume of diesel fuel, K-1 or any fuel dispensed other than gasoline on this sheet.

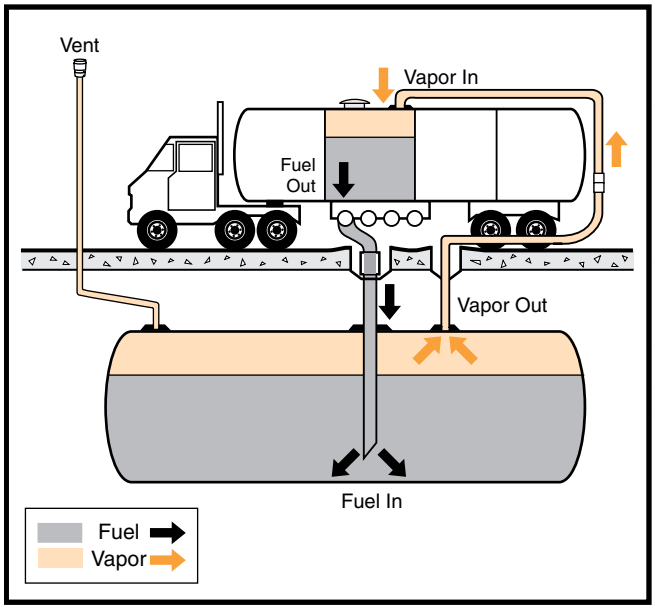
Some vapor control is required at stations with an annual throughput greater than 100,000 gallons. See the regulation for details or contact DEP/Air Bureau office in Augusta, Bangor, Portland, or Presque Isle.

STAGE I VAPOR RECOVERY OPTIONS

There are two types of vapor recovery systems. Which type do you have?

- **Two-Point/Manifolded Systems**, which have two separate connections to the underground tank, one for delivery of the product and the other for the transfer of vapors.

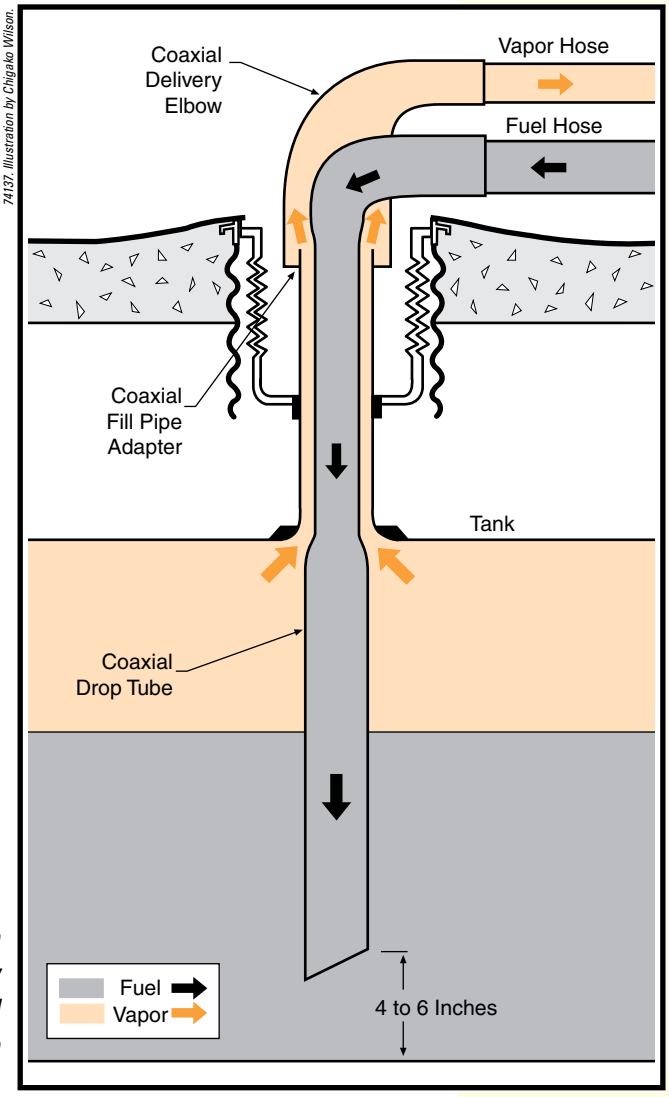
There are two types of vapor recovery systems. Which type do you have?



Reproduced with permission from PEI/RP300-09 Recommended Practices for Installation and Testing of Vapor-Recovery Systems at Vehicle-Fueling Sites Copyright ©2005, Petroleum Equipment Institute (PEI), Tulsa, OK 74137. Illustration by Chigako Wilson.

With Stage I vapor recovery, vapors displaced from the storage tank during a delivery flow through the vapor piping and the vapor-recovery hose into the fuel-delivery truck. There should be no flow of air or vapor through the storage tank vent pipe.

- **Coaxial Systems** have one tank opening that serves to transfer both fuel and vapors. This is usually accomplished by installing a 3-inch diameter drop tube inside the 4-inch fill pipe, creating a gap between the drop tube and the fill pipe through which vapors can pass.



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Coaxial Stage I vapor recovery uses a drop tube with a narrow top section to create a vapor pathway between the drop tube and the fill pipe. A special coaxial delivery elbow must be used to complete the fuel and vapor pathways to the fuel-delivery truck.

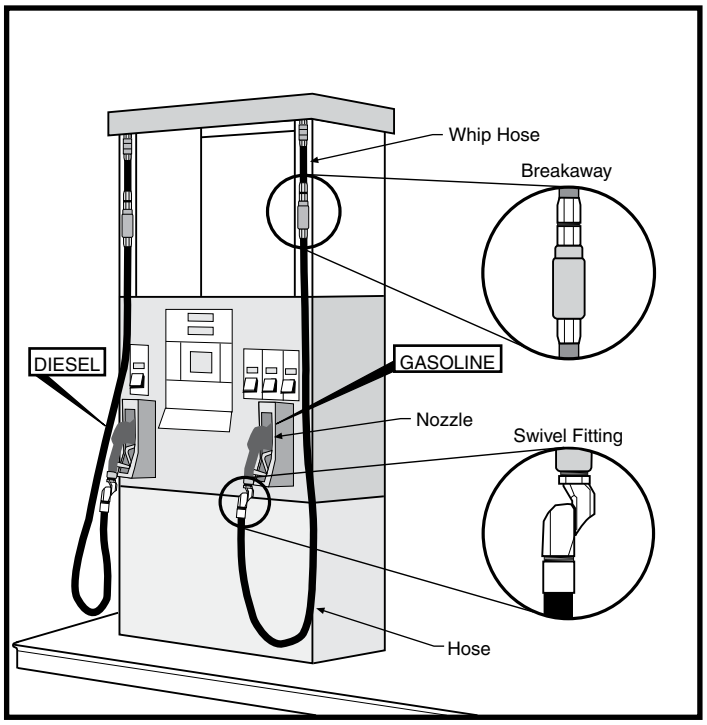
DISPENSERS

In Maine, two authorities regulate fuel dispensers: the State Fire Marshal for safety issues and the Department of Agriculture for meter accuracy. Although the DEP has no specific regulatory authority over the dispensers themselves, the liquid-handling components inside and outside of dispensers are a frequent source of weeps, leaks, or spills that have the potential to impact the environment. The purpose of this *TankSmart* module is to familiarize you with some dispenser components and provide some basic guidance on how to respond to a weep or leak from a dispenser.

The purpose of this module is to familiarize you with some dispenser components and provide some basic guidance on how to respond to a weep or leak from a dispenser.

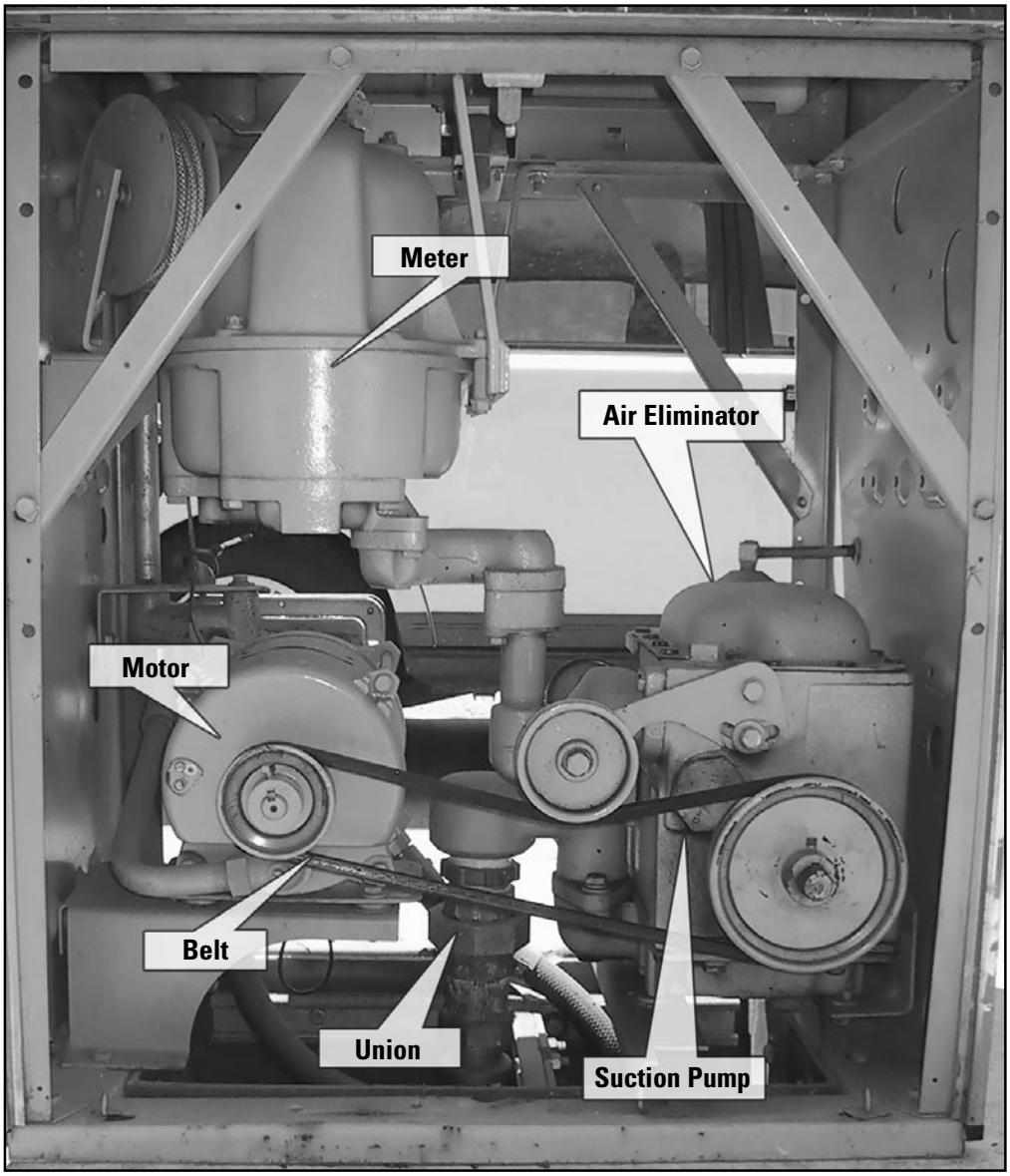
It is part of the Class A/B operator's job to see to it that discharges from fuel dispensers are not occurring. Weeps, leaks, and spills can come from broken, worn out, or improperly maintained dispensing equipment. It is your responsibility to ensure that your dispensing equipment, including, but not limited to, hoses, breakaway valves, and nozzles, is visually inspected on a daily basis to ensure that it is working properly and leak free. It is your job to check the inside of dispensers for weeps and leaks on a monthly basis.

NOTE: the Petroleum Equipment Institute (PEI) publishes a Recommended Practice titled *Recommended Practices for Inspection and Maintenance of Motor Fuel Dispensing Equipment* (RP500) that includes detailed instructions and checklists for conducting daily, monthly, and annual fuel-dispenser inspections. As an industry recommended practice, all UST owners and operators should follow the procedures described in this document. For more information on this document go to: ***www.pei.org/rp500*** or contact the Petroleum Equipment Institute at 918-494-9696.



Reproduced with permission from PEI/RP500-05 Recommended Practices for Inspection and Maintenance of Motor Fuel Dispensing Equipment. Copyright ©2005, Petroleum Equipment Institute (PEI), Tulsa, OK 74137. Illustration by Chigako Wilson.

The DEP does regulate the piping beneath dispensers. Below-grade piping located beneath dispensers installed after March 2004 must be set within a liquid-tight container called a dispenser sump. Dispenser sumps installed after March 2004 must be equipped with a sensor that continuously monitors for leaks.



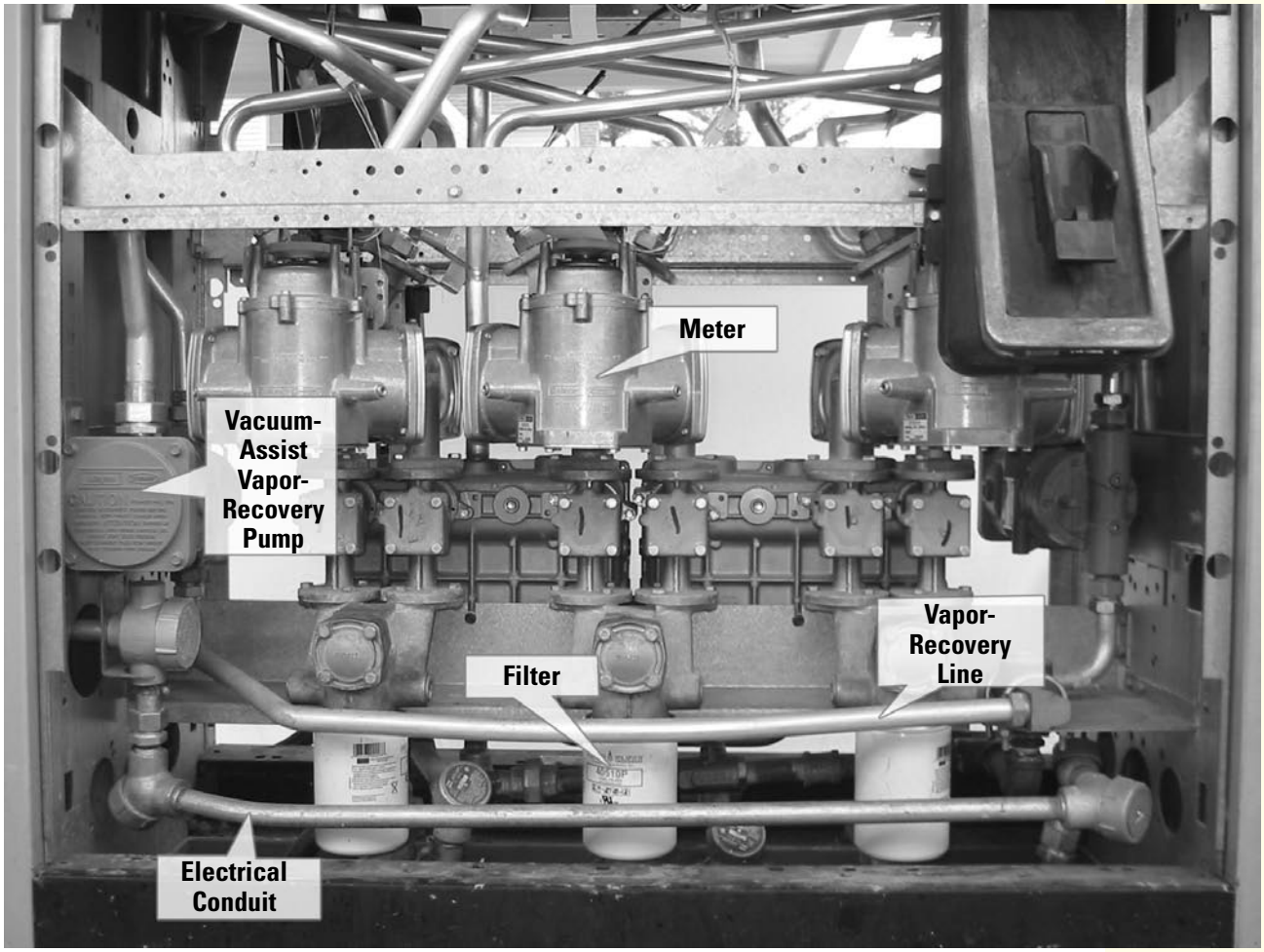
Inside view of a typical fuel dispenser used with a suction piping system. (See the* TankSmart *Suction Pumping Systems module.)

You must notify the DEP every time the monitoring system ALARMS because of liquid in the sumps.

WHAT MUST YOU DO IF YOU HAVE A DISPENSER WITH SUMPS AND CONTINUOUS ELECTRONIC MONITORING?

If you have a dispenser sump with continuous electronic monitoring, **you must notify the DEP every time the monitoring system ALARMS because of liquid in the sumps**. As soon as you hear an alarm, take the following steps:

- Determine which dispenser sensor is the source of the alarm. Your alarm console should include a listing of sensor locations. Open the dispenser cabinet where the sensor is located to determine the cause of the alarm. Is there water or fuel in the sump? Is fuel leaking from a fitting or component inside the dispenser?



Inside view of a typical fuel dispenser used with a pressurized piping system.

- If you see any signs of leakage or liquid in the dispenser sump, close the emergency shutoff valve for the appropriate product if the piping is pressurized, or shut down the leaking pump if it is a suction system.
- Call the DEP to report evidence of a leak at 207-287-2651.
- Call your service technician.
- Have your service technician remove all fluids from the dispenser sumps. **Fuel that accumulates in dispenser sumps is a significant fire hazard.**

WHAT MUST YOU DO IF YOU HAVE A DISPENSER WITHOUT SUMPS AND/OR CONTINUOUS ELECTRONIC MONITORING?

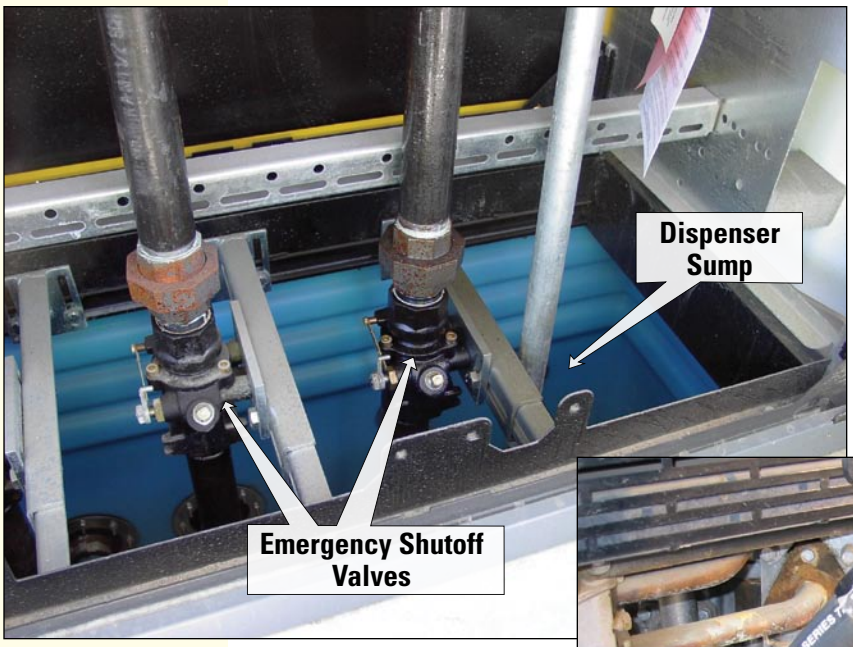
- Look inside your dispensers at least monthly. Is fuel leaking inside the dispenser? If there is a dispenser sump, is there fuel or water in the sump?
- If you see any signs of leakage inside the dispenser or liquid in the dispenser sump, close the emergency shutoff valve for the appropriate product if the piping is pressurized, or shut down the leaking pump if it is a suction system.

Fuel that accumulates in dispenser sumps is a significant fire hazard.

- To report evidence of a leak, call the DEP at 207-287-2651, or call the 24-hour Spill Hotline at 1-800-482-0777.
- Call your service technician.
- Have your service technician remove all fluids from the dispenser sumps, if they are present. **Fuel that accumulates in dispenser sumps is a significant fire hazard.**

WHAT ABOUT EMERGENCY SHUTOFF VALVES?

Emergency shutoff valves (also called crash valves, impact valves, or fire valves) are required for pressurized pumping systems. The valves are located at the base of the dispenser to prevent fuel releases by closing automatically should a vehicle crash into the dispenser or in case there is a fire inside the dispenser. There is a separate emergency shutoff valve for each grade of fuel that enters the dispenser. Emergency shutoff valves must be tested annually as part of your annual inspection.



Emergency shutoff valves are installed at the base of dispensers that have pressurized piping to prevent releases in the event a vehicle hits the dispenser or there is a fire at the dispenser. Dispenser sumps are installed to contain any leaks or drips from components inside the dispenser.

Crash valves can be manually tripped if you need to close them. If there is a leak inside a dispenser, tripping the appropriate crash valve should stop the flow of fuel into the dispenser. If you do not know how to manually trip your emergency shutoff valves, ask your service technician to show you how.

Courtesy of Marcel Moreau Associates, Portland Maine.

If a dispenser has no containment sump, leakage from any of the dispenser components goes directly into the ground. If the leakage goes undetected, serious contamination problems can result.

OUT-OF-SERVICE TANKS

An underground storage tank system is classified as "out-of-service" when it is neither receiving nor dispensing fuel. Even if a tank is not in use, it has the potential to be an environmental hazard unless the requirements for taking a tank temporarily out of service are followed or the storage system is permanently closed. This *TankSmart* module describes the requirements for the following out-of-service conditions:

- **Tanks out of service for 3 to 12 months**
- **Seasonal operations** (e.g., marinas, campgrounds)
- **Tanks out of service for more than 12 months**
- **Permanent closure of a tank**

An underground storage tank system is classified as "out-of-service" when it is neither receiving nor dispensing fuel.

Taking a storage tank out of service means doing more than simply shutting off the electricity, locking the door to the facility, and walking away. Unless a storage system is properly taken out of service, you may never be able to bring it back into service.

TANKS OUT OF SERVICE FOR 3 TO 12 MONTHS

If you are planning to take your tank(s) out of service for 3 to 12 months, you must take the following measures:

- Notify the DEP within 3 months of the time when the tank stopped routinely receiving or dispensing fuel.
- Maintain the cathodic-protection system (if applicable).
- Continue to perform leak detection OR drain the tank so there is no more than 1 inch of residual liquid (both product and water).
- Leave the vent lines open.

- Cap/secure all other lines, pumps, manways, and ancillary equipment.
- Submit a passing Annual Inspection Report. (See the *TankSmart* Annual Inspection module.)
- Report and investigate any evidence of a leak.

SEASONAL OPERATIONS

A seasonal operation is one that regularly operates for only part of each year. If your tank(s) is out of service for more than 3 months every year, all requirements for out-of-service tanks described above apply. If your tank(s) is out of service for less than 3 months, then all of the rules applicable to in-service tanks, including leak detection requirements, apply during the period the tank is inactive.

TANKS OUT OF SERVICE FOR MORE THAN 12 MONTHS

If your tank(s) is out of service for more that 12 months, it must be properly **REMOVED** unless the owner obtains **WRITTEN APPROVAL** from the DEP to remain out of service beyond the 12 months. The owner must request approval in writing from the DEP before the end of the initial 12-month out-of-service period.

RETURNING A TANK TO SERVICE

When you return your tank(s) to service, you must comply with the following requirements:

When you return your tank(s) to service, you must comply with requirements.

- The tank system must be in compliance with all applicable requirements of the DEP tank regulations, including maintaining proper registration and having fulfilled all of the requirements for being temporarily out of service.
- The tank system must have passed an annual inspection in the last 12 months.
- The tank and its associated piping must pass a tightness test, and the results must be submitted to the DEP prior to returning to service. Contact the DEP to determine the specific tightness-testing needs for your storage system.
- You must notify the DEP in writing BEFORE you return the tank(s) to service.

PERMANENT CLOSURE OF A TANK

If you plan to permanently close a tank, contact the DEP for guidance. Call 207-287-2651, or write: 17 State House Station, Augusta, ME 04333.

Tanks that remain out of service for more than 12 months MUST be permanently removed unless the owner applies for and receives permission from the DEP to keep the tank out of service BEFORE the 12 month out of service period ends.

If you plan to permanently close a tank, contact the DEP for guidance.

Maine DEP staff can assist you with permanent closure information upon request.

Call: 207-287-2651

ABOVEGROUND STORAGE TANKS (ASTs)

ASTs that contain petroleum products often have underground product piping connected to them. These underground piping systems present all of the same problems with leakage as underground piping connected to underground storage tanks (USTs), but until 1991, underground piping connected to ASTs was subject to very few rules. Since 1991, Maine has been increasing the regulatory requirements associated with underground piping connected to ASTs. By 2011, this piping will be meeting the same requirements as underground piping connected to USTs.

ASTs that contain petroleum products often have underground product piping connected to them.

Maine DEP has proposed regulations that would include operators of ASTs with underground piping in the *TankSmart* UST operator certification program. For current information concerning the status of the regulations, call the Maine Department of Environmental Protection (DEP) at 207-287-2651.

ASTs, whether they have aboveground or below-ground piping, must also meet the requirements of other regulatory programs, including the Fire Marshal and the Spill Prevention, Countermeasure, and Control (SPCC) programs.

The purpose of this *TankSmart* module is to give the AST owner a brief overview of the regulatory programs applicable to ASTs. The following is a chronology of the development of regulations for underground piping connected to ASTs in Maine:

June 24, 1991 – New installations of underground piping associated with ASTs must be installed and maintained under the same rules as those that apply to piping associated with underground tanks.

July 1, 1995 – All underground piping that is in service must be constructed of a non-corrosive material approved by the DEP.

August 23, 2006 – The Maine Legislature adopted a new law that established requirements for facilities with aboveground tanks storing motor fuel (i.e., gasoline, diesel, biodiesel, aviation gasoline, jet fuel, gasohol, or other fuels used in the operation of a vehicle or motor engine) and that are connected to underground piping. This new law established the following important deadlines for aboveground motor-fuel facilities:

- **January 1, 2007** –register motor-fuel ASTs (except for diesel ASTs) that have underground piping

- **July 1, 2007, and annually thereafter** – submit inspection reports from a certified tank installer or certified tank inspector of underground piping systems associated with motor-fuel ASTs (except for diesel ASTs, see *TankSmart* Annual Inspection module)
- **January 1, 2009** – register diesel ASTs that have underground piping (see *TankSmart* Annual Inspection module)
- **July 1, 2009, and annually thereafter–** submit inspection reports from a Certified Tank Installer or Certified Tank Inspector of underground piping systems associated with diesel ASTs
- **January 1, 2011** – retrofit pre-June 24, 1991, underground piping systems at all motor-fuel ASTs (including diesel) to meet the DEP's leak detection standards (see *TankSmart* Piping: Double-Walled Systems Module)

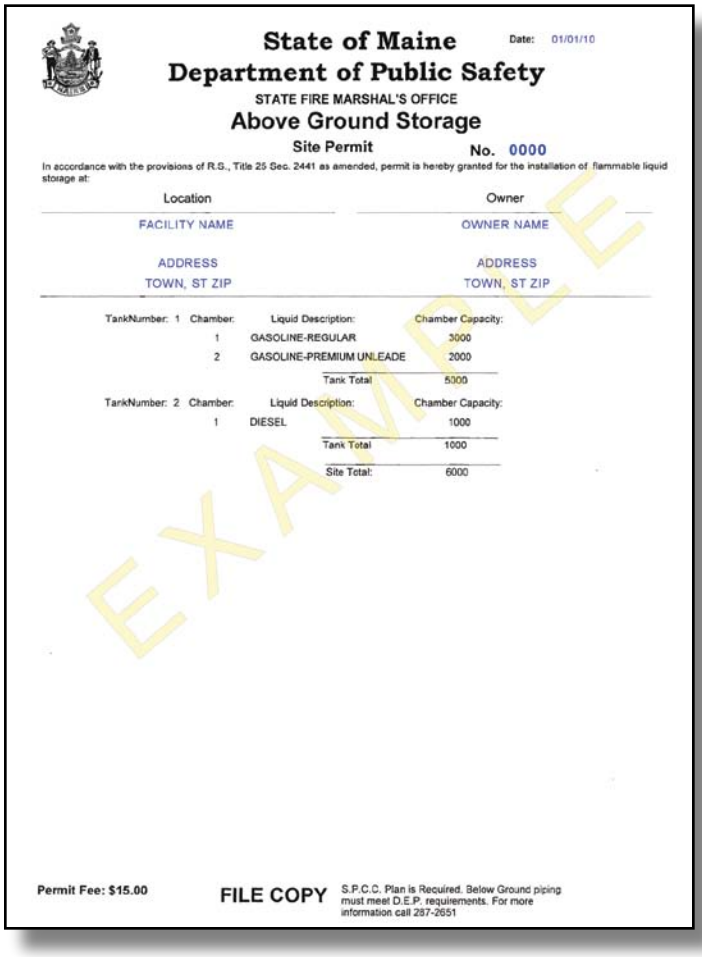
Underground piping associated with ASTs is a frequent source of leaks.

ADDITIONAL REQUIREMENTS THAT APPLY TO ASTs

Maine State Fire Marshal's Permit

Any aboveground petroleum storage tank larger than 60 gallons that is not connected directly to an oil-burning appliance must be permitted by the State Fire Marshal's Office prior to the installation of the AST. Any change in facility information must be updated with the State Fire Marshal's Office.

For more information regarding the AST permitting procedure, contact the Maine State Fire Marshal's Office at 207-626-3890.



State of Maine
Department of Public Safety
STATE FIRE MARSHAL'S OFFICE
Above Ground Storage
Site Permit
Date: 01/01/10
No. 0000

In accordance with the provisions of R.S., Title 25 Sec. 2441 as amended, permit is hereby granted for the installation of flammable liquid storage at:

Location	Owner
FACILITY NAME	OWNER NAME
ADDRESS	ADDRESS
TOWN, ST ZIP	TOWN, ST ZIP

TankNumber:	Chamber:	Liquid Description:	Chamber Capacity:
1	1	GASOLINE-REGULAR	3000
	2	GASOLINE-PREMIUM UNLEADE	2000
		Tank Total	5000
TankNumber:	2 Chamber:	Liquid Description:	Chamber Capacity:
	1	DIESEL	1000
		Tank Total	1000
		Site Total:	6000

EXAMPLE

Permit Fee: $15.00 FILE COPY S.P.C.C. Plan is Required. Below Ground piping must meet D.E.P. requirements. For more information call 287-2651

SAMPLE PERMIT. ***Any aboveground petroleum storage tank larger than 60 gallons that is not connected directly to an oil-burning appliance is required to be permitted by the State Fire Marshal's Office.***

For more information regarding the AST permitting procedure, contact the Maine State Fire Marshal's Office at 207-626-3890.

Spill Prevention Control and Countermeasure (SPCC) Plan

Federal SPCC plan requirements apply specifically to AST oil storage facilities with an aggregate storage capacity greater than 1,320 gallons and where a discharge could reach a navigable water body, either directly or indirectly. Any 55-gallons or larger aboveground oil storage container or tank counts toward the total aggregate storage capacity. Most areas in Maine are considered locations where a discharge could reach navigable waters.

SPCC plans must be prepared for SPCC-regulated facilities in accordance with good engineering practices to prevent and clean up spills from aboveground oil storage tanks.

SPCC plans must be prepared for SPCC-regulated facilities in accordance with good engineering practices to prevent and clean up spills from aboveground oil storage tanks. "Oil," as defined in the federal regulations, includes petroleum oils such as gasoline, diesel, and heating oil, as well as non-petroleum oils such as animal or vegetable oils, synthetic oils, and mineral oils.

In 2002, the Maine Legislature gave the DEP authority to oversee compliance with federal SPCC requirements for aboveground storage facilities that are used to market and distribute oil.

An SPCC plan must list the containment equipment and structures used to prevent spills from reaching groundwater or surface water and identify the inspection, monitoring, and oil-transfer procedures that will be followed to prevent a spill. If a spill occurs, a well-developed SPCC plan identifies who should be called and specifies steps, or "countermeasures," that should be employed to contain the spill and minimize environmental impacts.

A qualified professional engineer must examine the plan and attest that it has been prepared in accordance with good engineering practices. The owner must review the plan every five years, giving consideration to any changes in codes, standards, and available technology in order to keep facilities up to the "state-of-the-art." The review is the means for determining if there is a need to amend the plan. Plans must also be amended whenever there is a change in the facility that would affect the plan.

OVERFILL PREVENTION

Statistics show that overfills are the most common cause of petroleum spills at AST facilities in Maine. The federal SPCC rules require that ASTs be provided with overfill-protection equipment.

Statistics show that overfills are the most common cause of petroleum spills at AST facilities in Maine. The federal SPCC rules require that ASTs be provided with overfill-protection equipment.

Overfill-protection devices for aboveground tanks include tank-level gauges, high-level alarms, and automatic shutoff devices. If tank gauges are used to meet the federal overfill-protection requirements, they must be readily visible to the delivery person, or if they are not visible to the delivery person, a second person must directly monitor the gauge during filling operations. High-level alarms should sound when the tank is at 90% capacity, and automatic shutoff devices should operate when the tank reaches 95% capacity.

If you have double-walled tanks, and they are not located in a containment dike, the SPCC rule requires that two forms of overfill protection be installed for each tank.

- An audible or visual overfill alarm that goes off when the tank reaches 90% capacity
- An automatic shutoff device designed to shutoff flow to the tank when it reaches 95% capacity

Courtesy of Marcel Moreau Associates, Portland Maine.

Overfill prevention for ASTs is very important. This tank is equipped with a gauge that can be easily read by the delivery person and a high level alarm.

If you have tanks that are located within a containment dike, only one type of overfill-protection device per tank is required.

As an AST operator, you must be aware of what type of overfill-prevention equipment is installed on your aboveground tanks and ensure that the equipment is operating properly at all times.

For additional information on ASTs, contact the Oil Spill Prevention Unit at

207-287-2651

or go to:

www.maine.gov/dep/rwm/aboveground tanks/index.htm

CONSUMPTIVE USE HEATING OIL TANKS & DIESEL-FUELED GENERATOR TANKS

A "consumptive use" heating oil tank is one that is connected to a boiler or furnace that is used to heat a building interior. Heating oil tanks leak just like gasoline tanks, and when these tanks leak, they can pose a significant threat to Maine's drinking water supplies. For this reason, the State of Maine regulates all underground tanks, including heating oil tanks.

A "consumptive use" heating oil tank is one that is connected to a boiler or furnace that is used to heat a building interior.

If you own or operate a consumptive use heating oil tank, you must comply with the rules that apply to your tank system and the type of fuel stored in that system. (See: ***www.maine.gov/dep/rwm/ust/plaintalkonheatingoil.htm.***) However, consumptive use heating oil tanks are not part of the UST operator program and are not required to have Class A/B and Class C operators.

A diesel-powered emergency generator that is fueled with heating oil is not a consumptive use heating oil storage system. Although the fuel stored is heating oil, the tank is connected to an engine, not a boiler or furnace. For purposes of the UST operator program, your tank is considered a motor-fuel tank if it is connected to a generator, even if the fuel in the tank is heating oil. Underground tanks connected to generators, no matter what fuel is stored in the tank, must have Class A/B and Class C operators.

Your tank is considered a motor-fuel tank if it is connected to a generator, even if the fuel in the tank is heating oil.

If your underground tank is connected to a diesel generator, you must check your facility registration to be sure it is registered as a tank with "DIESEL" for the fuel type, not "#2 FUEL OIL." If you have a generator tank that indicates #2 FUEL OIL as the tank contents, you must notify the DEP that your tank is connected to a generator so your registration can be corrected to accurately reflect the fuel usage and you can receive the appropriate *TankSmart* modules. Please allow a minimum of 10 days after notifying the DEP before attempting to take the Class A/B Operator Certification test. This will allow the DEP to update your records so the *TankSmart* program can provide you with the correct test questions.

For more information on consumptive use heating oil tanks that are connected to boilers or furnaces, contact the DEP's Tanks Unit at 207-287-2651 or review the document *Plain Talk on Heating Oil Tanks* at: *www.maine.gov/dep/rwm/ust/plaintalkonheatingoil.htm.*

ETHANOL-BLENDED GASOLINE

Now that ethanol is routinely blended with gasoline in Maine (typically 10% ethanol with 90% gasoline, known as E10), UST owners and operators must pay attention to several new fuel-storage and fuel-quality-related issues. These issues may cause leaks in tanks, piping, and/or dispensers, and so have an environmental aspect to them as well.

Now that ethanol is routinely blended with gasoline in Maine (typically 10% ethanol with 90% gasoline, known as E10), UST owners and operators must pay attention to several new fuel-storage and fuel-quality-related issues.

The potential issues you should be aware of regarding storing, distributing, and dispensing ethanol blended fuels are:

- **Compatibility with system components**
- **Phase separation**
- **Mobilization of sludge and particulates**

COMPATIBILITY WITH SYSTEM COMPONENTS

Components and equipment used for storing and dispensing conventional fuels are time tested for compatibility and are readily available through your petroleum supplier. E10 has been used for 25 years or more in parts of the Midwest, and with few exceptions, experience has shown that traditional fuel storage and dispensing systems are not affected by the presence of ethanol at this level.

Experience with higher concentrations of ethanol in gasoline is much more limited. It is clear that high concentrations of ethanol such, as E85, are NOT compatible with traditional storage and dispensing systems. Storage and dispensing systems that are manufactured to be compatible with up to 100% ethanol are available, but these systems must be specially manufactured for alcohol service. You cannot store and dispense high alcohol blends, such as E85, in standard storage systems. If you are considering storing a high-ethanol blend of gasoline, there is much useful information on the Iowa Department of Natural Resources website:
www.iowadnr.gov/land/ust/technicalresources/ethanol.html

It is not known, however, whether intermediate blends of ethanol (e.g., E15, E25) can be stored and dispensed in systems that were designed for traditional gasoline without ethanol. This issue is currently being studied and debated at the national level. For the time being, however, federal fuel regulations place the maximum allowable ethanol concentration for use in vehicles designed to run on standard gasoline at 10%. There are few material-compatibility issues associated with storing E-10 gasoline in traditional storage and dispensing systems.

PHASE SEPARATION

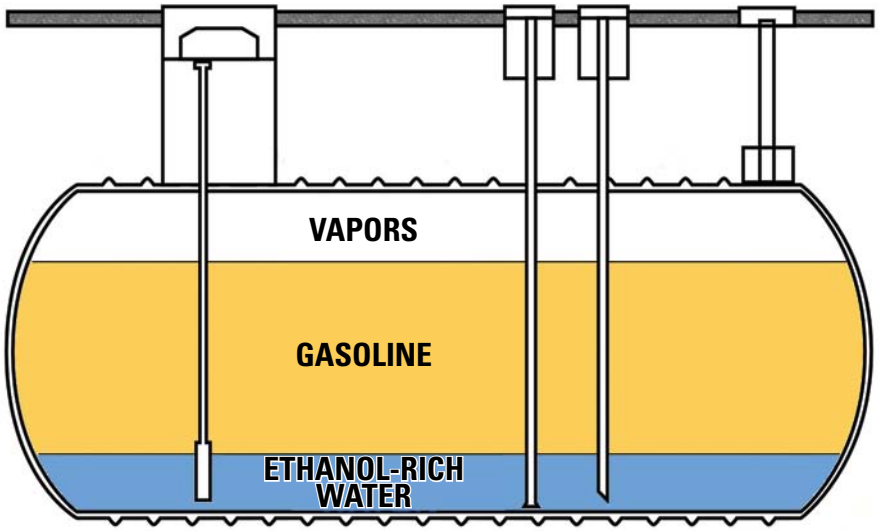
Ethanol mixes reasonably well with gasoline, but it is also highly attracted to any water in your tank. In fact, ethanol would rather be in water than in gasoline. So when water infiltrates a tank through spill bucket drain holes, loose manway covers, and loose tank-top fittings, the ethanol will absorb the water. If enough water is present, the ethanol/water mixture will separate out of the gasoline and settle to the bottom of the tank. This phenomenon is known as "phase separation."

Ethanol mixes reasonably well with gasoline, but it is also highly attracted to any water in your tank and would rather be in water than in gasoline.

With phase separation, the tank contains a bottom layer consisting of a mixture of water and alcohol, and an upper layer consisting of gasoline that in all likelihood no longer meets specifications. If the alcohol/water layer is high enough, it will be drawn into the pump intake and dispensed into vehicles. Vehicles receiving this mixture will stall out within sight of the fuel facility and will need to have their fuel systems cleaned out before they can run again. This makes for very unhappy customers.

In addition, your fuel tank, piping, and dispensing systems now hold a concentrated alcohol/water mixture that is very corrosive. Many of these

PHASE SEPARATION IN GASOLINE/ETHANOL FUEL BLENDS



A few tens of gallons of water in a tank is enough to cause phase separation in many thousands of gallons of gasoline, resulting in hundreds of gallons of an alcohol/water mixture in the bottom of a tank. Frequent monitoring for water is necessary to protect the quality of ethanol-blended fuels.

components will not be compatible with this alcohol/water mix so it is very important that this liquid be pumped out of the tank and flushed from the piping and dispensing system as soon as possible. Call your service technician to deal with this problem immediately.

You must ensure that NO WATER can get into any tank containing E10 from any of the tank-top fittings. Water in a spill bucket should NEVER be drained into the tank. All water-intrusion problems must be corrected immediately if you are storing ethanol-blended fuel.

You should check your fuel tanks for water frequently to prevent phase-separation problems. This should be done using a gauge stick and water-finding paste specifically formulated for alcohol fuels. Read the water-finding-paste instructions carefully. The color changes that occur when water is present are different for alcohol pastes than for non-alcohol pastes. You should use a gauge stick to monitor for water, even if you have an automatic tank gauge that has water-sensing capabilities. The tank-gauge water sensor is not sensitive enough to detect the small amounts of water that can cause phase-separation problems.

You must ensure that NO WATER can get into any tank containing E10 from any of the tank-top fittings.

NOTE: Water sufficient to cause phase separation is evidence of a possible leak, which must be reported within 24 hours to the DEP Tanks Unit at 207-287-2651 or the 24-hour Spill Hotline at 1-800-482-0777.

MOBILIZATION OF SLUDGE AND PARTICULATES

Ethanol scours or loosens scale deposits on the internal surfaces of tanks and piping and mobilizes sludge in the bottom of the tank. This means there will be a lot of crud in the fuel, especially right after the first few loads of ethanol-blended fuel are delivered. Be sure to use filters in your dispensers that are intended for use with alcohol fuels. Consult your service technician or filter manufacturer for recommendations.

Filtration of alcohol fuels to protect fuel quality is essential. Be sure to use filters intended for use with alcohol fuels.

Some fuel filters also contain material that will swell in the presence of water and block the flow of any water/alcohol mixture through the filter. This type of filter is recommended to protect customers' cars from receiving bad fuel if phase separation should occur.

There have been a few instances in older steel tanks where the sludge and particulates in the tank were plugging corrosion holes and preventing the tanks from leaking. When ethanol fuel was introduced, the fuel cleaned out the sludge and particulates so that the tanks began to leak. Pay particular attention to leak detection when adding ethanol fuel to a tank that has previously held non-ethanol fuel.