1. Introduction
NC Department of Environment and Natural Resources
Division of Waste Management
Underground Storage Tank Section 919-707-8171

- Permits and Inspections Branch
- Corrective Action Branch
- Trust Fund Branch

Website: tankschool.ncdenr.gov

- Policy / Guidance Documents
  - NC General Statutes 143-215.94A –94UU
  - NC Administrative Code Title 15A Subchapters 02N and 02O
- Forms, Brochures, Tank school slides
- Emergency Operator Training materials

Handouts:
- Emergency Response Operator training material list
- Change in Tank Ownership list
- Diagram
- Compliance plan
- Evaluation
- Inspection Checklist

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Website: tankschool.ncdenr.gov

Helpful Hints:  - Put your facility ID # on EVERYTHING.
               - Record Keeping is VERY IMPORTANT
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2. Operator Training

Operator Training Requirements – from the 2005 Energy Policy Act

NC facility owners must designate a Primary and Emergency Response Operator for USTs.

Operator Training is valid until a facility receives a Notice of Violation.

Primary Operators

Daily responsibilities:

- Operation
- Maintenance
- Record-keeping

Knowledge of UST rules

Employee of the owner or facility operator - NOT a third-party contractor

Training can take place at facility with the inspector, if the facility is in compliance.

Training at Tank School because one of the following:

- Facility NOT in compliance at inspection
- Primary Operator not present at inspection
- You received less than 75% on the facility training test
- Newly appointed Primary Operator

Emergency Response Operators

Daily responsibilities:

- Controls and monitors fuel sales and dispensing
- Responds immediately to alarms or product releases
- Present at facility during all fuel dispensing operations

One ERO is required. The Primary Operator can also be the Emergency Response Operator.

Unstaffed facilities are those that do not have an ERO present for time periods longer than 86 hours – they must have automated equipment in place to notify the ERO in the event of leaks, spills, emergencies.
ERO training is conducted by the Primary Operator

You, the Primary Operator, are responsible to train Emergency Response Operators using the materials found online at tankschool.ncdenr.gov.

- Instructions for ERO training
- Slideshows – to use for ERO training
- **Emergency Placard** Sign – **NEEDS** to be posted in dispensing areas
- UST-26 form – helps you keep track of who has been trained
- Train your current employees within 15 days of Tank School
- Train all new employees before allowing them to control fuel and dispensing

Have a plan for your Emergency Response Operators

- Know where the fuel shutoff switch is
- Know how to turn off power to the dispenser
- Know how to bag a nozzle
- Call 911
- Call the Primary Operator
- Identify fire and vapor hazards – Insure spills and leaks pose no immediate hazard to human health or safety and environment
- Identify sensitive receptors. These are places that a spill may enter the environment, such as storm drains, curb cuts, gutters, swales, etc.
- Stop the spill and contain it before it reaches the environment.

Having a spill kit is highly recommended.

- Clean spills 5 gallons or less
- Contain larger spills until assistance arrives

Suggested Equipment

- Personal protective equipment
- Absorbent materials like kitty litter, sand, sawdust.
- Absorbent booms, absorbent pads
- Shovel, broom, bucket
- Caution tape, traffic cones
3. Inspections

- Every 2-3 years
- Physical Inspection of equipment
- Records Review
- Inspector records observations
- 1-2 hours

Compliance allows you to receive a valid permit

Annually, the UST owner receives:

- Permit application
- Invoice
- Can pay online - http://tankschool.ncdenr.gov/
- Compliance questionnaire – we will fill out a compliance plan. Save it for future use.

Ownership Change

- Check website and class hand out for details
- Complete all paperwork within 30 days
- Previous owner’s permit NOT valid after 30 days
- Process begins with UST 8 and UST 15

Tank Closures

Temporary Closure

- UST remains underground
- UST taken out of service
- Owner and operator still responsible for UST
- Remove product to less than one inch. (This low level is not possible using your dispensers. You will have to have it specially pumped out.)
• Maintain corrosion protection
• Submit UST 8
• Continue paying tank fees
• Consult brochure at tankschool.ncdenr.gov – links at bottom

**Permanent Closure**

• UST removed from ground
• Owner and operator responsible for site until all corrective action satisfied
• Guidelines issued by Corrective Action Branch (CAB)
• Start the process by submitting UST 3 form

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**Noncompliance**

If you do not pass your compliance inspection you may receive a **Notice of Violation (NOV)**

The NOV is mailed to UST owner. If a corporation, mail must be sent to the registered agent listed with the NC Secretary of State.

The NOV contains:

• Violations
• Corrective actions that need to be performed
• Inspection checklist

HINT: Put your facility ID # on EVERYTHING.

**Recommendation for Enforcement**

If a facility does not come back into compliance within given timeframe, or has repeat violations a recommendation for enforcement will be sent. This is known as the “10-day letter”. It includes a list of violations and a response deadline date.

Enforcement may involve:

• Facility permit being put on hold
• No permit issued (meaning you cannot receive fuel)
• Civil penalties
• Prove compliance to resume operation

Operators must be retrained if a facility receives a Notice of Violation.
4. Spill & Overfill Prevention

The purpose of spill and overfill prevention is to eliminate the potential for release of product during fuel deliveries.

**Spill prevention:** Contain drips and spills of fuel that occur when the tanker delivery hose is uncoupled from fill port.

**Overfill prevention:** Provides the transporter with an indication that tank is approaching full during delivery.

**Fill Ports**

- must have Spill Buckets
  - designed to TEMPORARILY contain spilled fuel
  - NOT designed to hold or store fuel for a long time
  - Typically 5-25 gallon capacity
  - MUST be empty, clean, undamaged
  - Garbage, water or fuel in the spill bucket takes up space designed for spilled fuel.

**Installations AFTER Nov 1, 2007 require secondary containment (double walls) for:**

- Tanks
- Piping
- **Spill Buckets**

After 11/1/2007

- New spill buckets are double-walled
- Electronic sensor monitors interstice (the space between the walls)
- Sensor wired to a computer/console/printer
- REQUIREMENTS
  - Two printouts per month for each spill bucket sensor
    - Sensor Status printout
    - Alarm History printout
  - Keep each printout for 12 months
  - UST-22B form every year (checks bucket sensor)
  - UST-23 form every 3 years (checks bucket tightness)
Overfill Equipment

A. Ball float
B. High level alarm
C. Flapper valve / Auto shutoff device

A. Ball float valves

• Reduce the flow of delivery from the tanker
• Slow the fuel delivery at 90% tank capacity or 30 minutes before overfilling
• Does NOT stop fuel delivery
• Can ONLY be VERIFIED by
  o a picture
  o written verification (UST-22A, invoice, sometimes original UST8)
• NOT compatible with
  o Pressurized fuel delivery
  o Suction piping
  o Coaxial vapor recovery

B. High Level Alarm

• Does NOT reduce or stop fuel delivery
• An audible and/or visible warning at 90% tank capacity
• Must be located to be heard / seen at delivery site
• Verified visually

C. Flapper valve / Auto shutoff device

• Reduces and then stops the fuel delivery into the tank
• Stops flow at 95% capacity
• But, tanker truck is still gravity fed, so there can be a spill
• Usually verified visually (in the fill port)
Overfill Responsibilities

- Ensure the amount of fuel ordered will fit in the tank
- Monitor the fuel delivery
  - Lock fill ports without overfill devices
  - Have spill response supplies ready
- Use signs and notify the delivery person about the type of overfill device being used

Installations AFTER Nov 1, 2007 REQUIRE

- UST-22A form every year (checks for operation / damage of the overfill device)

Vapor Recovery

- Vapor takes up space in the tank
- When fuel goes in the tank, vapor comes out of the tank
- Division of Air Quality regulates this, but DWM UST checks that you have the equipment
- Kerosene and Diesel vapor recovery is not required
- Inspector checks if vapor recovery is present and operational

Two types of vapor recovery equipment

- Coaxial – within the fill port opening in the spill bucket. Fill tube is within a larger vapor recovery tube
- Dual point – separate opening into tank with spring loaded valve. Can also be a manifold.

Alternative Fuels and compatibility

- E10 (10% Ethanol /90% Gasoline)
- B20 (20% Biodiesel / 80% Diesel)
- E85 (85% Ethanol / 15% Gasoline)

The same rules that apply to Gasoline/ Diesel apply to E10 and B20.
Additional rules apply to E85

- Submit UST-20 form prior to storing fuel that is
  - Greater than 10% Ethanol
  - Greater than 20% biodiesel
- UST-20 form completed by UST owner / operator AND equipment contractor or Professional Engineer (PE)
- Must include
  - documents verifying compatibility, OR
  - compatibility analysis by a PE
5. Corrosion Protection: Tanks
Tank corrosion protection concerns protecting the integrity of the UST walls

There are 4 types of corrosion protection for tanks:

A. Non-corrodible materials: FRP (fiberglass reinforced plastic), composite, jacketed, clad)  
B. Internal Lining  
C. Sacrificial Anodes  
D. Impressed Current

A. Non-corrodible UST Materials  
- FRP (Fiberglass Reinforced Plastic)  
- DW FRP (Double Walled Fiberglass Reinforced Plastic)  
- Steel/FRP Composite  
  o Glasteel  
  o ACT100  
- Jacketed/ Clad

Requirements for Non-corrodible Materials  
- **Written verification** of tank material  
  o Installation or repair invoice  
  o Original UST-8 form signed by installer at time of installation  
  o Verifiable photographs of installation  
- Visual verification (not typical for tanks)  
- **Corrosion Protection Testing is NOT required**

B. Internal Lining – A lining adhered or attached inside of a tank

Requirements:  
- **Internal inspection within 10 years** of installation  
- Then **every 5 years** thereafter  
- **Tightness test after** every internal inspection  
- Most recent internal inspection results  
- Most recent tightness test results
IMPORTANT:

- National code or standard used for installation
- Repair invoices

C. Sacrificial Anodes - A more easily corrodible material such as zinc or magnesium connected to the tank by welding or lead wires. The anode corrodes before the UST.

Requirements:

- Test every 3 years
- Performed by qualified cathodic protection tester
- Report results on UST-7A form
- Keep the (2) most recent tests

D. Impressed Current - A more easily corrodible material such as zinc or magnesium connected by wires, located in the soil around the structures (tank and piping) with an electrical current applied to anodes. System is connected to Rectifier box.

Requirements:

- Inspect and record reading every 60 days
- Rectifier readings on UST-21 form
- Test impressed current system every 3 years
- Test performed by qualified cathodic protection tester
- Report test results on UST-7B form

IMPORTANT

- Dedicated and protected circuit
- Power must never be interrupted
- No breaks in wiring system, or system fails
- Reading must NOT be zero
- Reading must remain steady, near the setting left by the tester.
Potential Problems with Cathodic Protection

- Broken wires (for example, under pavement)
- No power to the rectifier
- **Impressed Current, Rectifier, or Anode Test Fails**
  - [see website tankschool.ncdenr.gov > Guidance documents link on left > Corrosion Protection > Procedures for UST systems with inoperative of failed corrosion protection systems](tankschool.ncdenr.gov)
- **No electricity to Rectifier and Impressed Current system**
  - [see website tankschool.ncdenr.gov > Guidance documents link on left > Corrosion Protection > Procedures for UST systems with inoperative of failed corrosion protection systems](tankschool.ncdenr.gov)
6. Corrosion Protection: Piping

Three (3) places to consider piping corrosion:

1. Where the piping connects to the tank
2. The main run of piping between the tank and the dispenser
3. Where the piping connects to the dispenser

Corrosion Protection Methods

A. Isolated or Booted

B. Non-Corrodible Material

C. Sacrificial Anodes

D. Impressed Current

A. Isolated / Booted / Sleeved

- Visual verification or written verification if buried and not visible

B. Non-corrodible Material. FRP; DW/FRP; Flexible Piping; DW flex

- Visual verification or written verification of piping material such as installation invoice or repair invoice

C. Sacrificial Anodes - A more easily corroducible material such as zinc or magnesium connected to the piping by wires. The anode corrodes before the piping.

- Test every 3 years
- Hire a qualified cathodic protection tester
- Complete UST-7A form

D. Impressed Current – A more easily corroducible material such as zinc or magnesium connected by wires, located in the soil around the structures (tank and piping) with an electrical current applied to anodes. System is connected to Rectifier box.
Requirements:

- Inspect and record rectifier reading every 60 days (it is recommended you do it monthly to keep your schedule consistent with other requirements)
- Complete UST-21 form (rectifier readings)
- Test impressed current system every 3 years
- Test performed by qualified cathodic protection tester
- Complete UST-7B form (test results)

IMPORTANT

- Dedicated and protected circuit
- Power must never be interrupted
- No breaks in wiring system, or system fails
- Reading must NOT be zero
- Reading must remain steady, near the setting left by the tester.

Potential Problems with Cathodic Protection

- Broken wires (for example, under pavement)
- No power to the rectifier
- Impressed Current, Rectifier, or Anode Test Fails
  - see website tankschool.ncdenr.gov > Guidance documents link on left > Corrosion Protection > Procedures for UST systems with inoperative of failed corrosion protection systems
- No electricity to Rectifier and Impressed Current system
  - see website tankschool.ncdenr.gov > Guidance documents link on left > Corrosion Protection > Procedures for UST systems with inoperative of failed corrosion protection systems
7. Leak Detection: Tanks

We perform leak detection to discover a release BEFORE a major contamination incident occurs.

It is required for regulated systems with 2 exceptions:

- Temporarily closed tanks
- Emergency generators tanks installed before 11/1/07

Requirements

- Leak Detection must be conducted monthly
- Must detect a release from any portion of the tank
- Installed, calibrated, operated and maintained per manufacturer's instructions
- Third Party Certification
  - Documentation that your leak detection method works FOR YOUR UST system. www.nwglde.org (National Work Group on Leak Detection Evaluations)

ALL Leak Detection Methods have limitations

such as: tank size, minimum fuel levels, throughput, down time

Most Common Leak Detection Methods for USTs

A. Statistical Inventory Reconciliation (SIR)
B. Automatic Tank Gauging Systems (ATG)
C. Secondary Containment with Interstitial Monitoring (IM)

A. Statistical Inventory Reconciliation (SIR) - Statistical analysis of inventory, delivery, and dispensing data to detect leaks. Measurements taken with measuring stick or ATG console to nearest 1/8th inch daily. Analysis done by computer program.

Requirements

- Product measurement, for each tank, daily – keep for 12 months
- Water measurement, for each tank, monthly – keep for 12 months
- SIR reports from vendor, for each tank, monthly – keep for 12 months
Notes for SIR:

- Replace broken or unreadable tank sticks
- Same person measures daily (sticks tank)
- Measure and read meters at same time daily
- Use appropriate calibration charts
- Supply daily inventory to SIR vendor at end of month
- Review the SIR reports when you get receive them from the vendor
- Dispensers must be calibrated within past 18 months

B. Automatic Tank Gauging (ATG) Systems – A probe permanently installed in the tank measures product level and temperature. The probe is wired to the monitor inside the facility which calculates changes in product volume. It checks for leaks of 0.2 gph (gallons per hour).

ATG Testing Modes take place when fuel is not being dispensed or added to the tank
- Periodic (static) testing collects data over a long period of time with no use
- Continuous testing collects data during many short periods of time with no use. For example, CSLD and SCALD.

Requirements:
- Valid 0.2 gph test result, for each tank, monthly – keep for 12 months
- IMPORTANT: If a drinking water well is nearby, 0.2 gph test must be performed weekly – keep for 12 months

Notes for ATG:

- Probe – Check that wires are intact and it is capped
- Console – Check that it is powered ON and there are no warnings nor alarms.
- Know how to access and print the leak test results
- Check printouts routinely
- Follow manufacturer’s recommendations for test and service
- Check console after electrical storms
- Do not ignore warning or alarms
C. Secondary Containment with Interstitial Monitoring (IM)

This consists of a double walled tank (primary space) with monitoring of the space between the inner and outer wall. This space is called the interstice or interstitial space (secondary space). All monitors are connected to an IM console. Interstitial Monitoring uses electronic sensors to:

1. Detect a leaked substance using a Liquid Detecting Sensor, or
2. Detect change in conditions such as vacuum loss or change in brine level

Requirements:

- One valid sensor status test result, for each tank, monthly - keep for 12 months.

if installed BEFORE 11/1/2007 it is recommended to have:

- One alarm history test result, for each tank sensor, once a year

if installed AFTER 11/1/2007 it is REQUIRED to have

- One alarm history test result, for each tank sensor, monthly - keep for 12 months
- Check Tank Sensor every year and complete UST-22B form
- If using Liquid Detecting Sensor, perform an Interstice Tightness Test
  - At time of installation
  - 6 -12 months after installation
  - Every 3 years
  - Complete UST 6E/23D

Exception - Interstitial Monitoring without sensor. Double walled tank installed BEFORE 11/1/2007 may have a port or opening for checking the interstice. Maintain monthly log for each tank and keep for 12 months.

Other Leak Detection Methods you may be using:

- Enhanced Leak Detection
- Inventory Control and Tightness Testing
- Manual Tank Gauging and Tightness Testing
- Groundwater Monitoring
- Vapor Monitoring
- Mechanical Vacuum Gauging
8. Leak Detection: Piping

We perform leak detection to **discover a release** BEFORE a major contamination incident occurs.

It is **required** for regulated systems with 2 exceptions:

- Temporarily closed tanks/UST systems
- Emergency generator UST systems installed **before** 11/1/07

**Requirements**

- Installed, calibrated, operated and maintained per manufacturer's instructions
- **Third Party Certification**
  - **Documentation** that your leak detection method works FOR YOUR UST system.
  - [www.nwglde.org](http://www.nwglde.org) (National Work Group on Leak Detection Evaluations)

**ALL Leak Detection Methods have limitations**

such as: tank size, minimum fuel levels, throughput, down time

**Types of Piping Systems**

A. European (safe) Suction
B. American (standard) Suction
C. Pressurized

**A. European (safe) Suction** - Pump is under the dispenser

- Only one check valve located at dispenser
- Piping slopes from dispenser to tank
- Operates at less than atmospheric pressure
- If pipe is compromised, the suction is broken and the fuel will drain back to tank, therefore fuel does not remain in pipe to leak into the environment.

**Requirements**

- Installer or contractor must complete **UST-19** form to verify exempt suction
- Keep **UST-19** form
- Keep all records of maintenance and repairs
• If installed BEFORE 11/1/2007, leak detection is not required.
• If installed AFTER 11/1/2007, Interstitial Monitoring is required. (see below)

B. American (standard) Suction – Pump is under dispenser

• Two check valves, one at dispenser and one at tank holds fuel in the pipe regardless of suction.

Requirements

• Installed BEFORE 11/1/2007 a Line Tightness Test required every 3 years or SIR results can be used.
• Installed or replaced AFTER 11/1/2007, Interstitial Monitoring is required. (see below)

C. Pressurized – Submersible Turbine Pump (STP) located at tank

Two types of leak detection are required:

1. Automatic Line Leak Detector(1), either (a) Mechanical (MLLD) or (b) Electronic (ELLD), AND
2. One of the following Piping Primary Leak Detection(2) Methods:
   a. Line Tightness Test (LTT)
   b. Statistical Inventory Reconciliation (SIR)
   c. Electronic Line Leak Detector (ELLD)
   d. Interstitial Monitoring (IM)

1. Automatic Line Leak Detectors (ALLD)
   • Found in the tank sump on top of the submersible pump
   • Detect catastrophic leaks of 3.0 gallons per hour (gph)
   • May slow the flow of fuel if triggered

   a. Electronic Line Leak Detectors (ELLD) Requirements
      • Tested every year
      • Contractor /console checks for proper operation
      • Keep report/printout for inspector
      • Programmed to shut down pump if triggered
b. **Mechanical Line Leak Detectors (MLLD) Requirements**
   - Tested every year
   - Contractor needs to check for proper operation
   - Keep report for inspector
   - Will slow down rate of flow in pipe

2. **Piping Primary Leak Detection Method**
   a. Line Tightness Test (LTT)
   b. Statistical Inventory Reconciliation (SIR)
   c. Electronic Line Leak Detector (ELLD)
   d. Interstitial Monitoring (IM)

a. **Line Tightness Test (LTT)**
   Requirements
   - 0.1 gph LTT leak test conducted **yearly**
   - By a contractor or programmed in to the ELLD

b. **Statistical Inventory Reconciliation (SIR)** – Statistical analysis of inventory, delivery, and dispensing data to detect leaks. Measurements taken with measuring stick or ATG console to nearest 1/8\(^{th}\) inch daily. Analysis done by computer program.

Requirements
- **Submit dispenser meter readings to your SIR vendor** to have your SIR results cover your piping
- SIR **cannot be used for piping** leak detection to a satellite dispenser
- **Product** measurement, for each tank, **daily – keep for 12 months**
- **Water** measurement, for each tank, **monthly – keep for 12 months**
- **SIR reports** from vendor, for each tank, **monthly – keep for 12 months**

Notes for SIR:
- Replace **broken or unreadable** tank sticks
- **Same person** measures daily (sticks tank)
- Measure and read meters at **same time** daily
- Use appropriate **calibration chats**
• Supply daily inventory to SIR vendor at end of month
• Review the SIR reports when you get receive them from the vendor
• Dispensers must be calibrated within past 18 months

c. **Electronic Line Leak Detector (ELLD)**
   Requirements
   • 0.2 gph test report, for each piping run, monthly – keep for 12 months

d. **Interstitial Monitoring (IM)**
   Requirements
   • Installed Before 11/1/2007
     o Piping interstice must be open to the sump
     o Use sensor or visually inspect the sumps for fuel or water (if sensor, 2” from bottom of sump is standard)
     o **One valid sensor status test** result for **each sensor** in all containment sumps, **monthly - keep for 12 months**
     OR
     o **Written log** verifying sump check for each sump, **monthly - keep for 12 months**
   • Installed After 11/1/2007
     o Piping interstice is open to sump
     o Sump sensor is required and less than 2” from bottom
     o Sump sensor continuously monitors for leaks
     o (These requirements are the same for suction piping installed after 11/1/07)
     o **One valid sensor status test** result for **each sensor** in all containment sumps each **month**. Keep for **12 months**
     o **One alarm history test** result for **each sensor** in all containment sumps each **month**. Keep for **12 months**.
     o **Sump sensors** check **every year**. Complete form **UST-22B**
     o **Sump interior** check **every year**. Complete form **UST-22C**
     o **Sump integrity** check **every 3 years**. Complete form **UST-23B**
     o **Piping integrity** check **every 3 years**. Complete form **UST-23C**
9. Releases

Releases of fuel fall into two categories

- Suspected releases
- Confirmed releases

Reasons to suspect a release include:

- Leak detection failures
  - IM sensor report indicates an alarm (Interstitial Monitoring)
  - ATG report indicates Fail or Increase (Automatic Tank Gauge)
  - SIR Report indicates Fail, inconclusive or anything other than pass for ANY month
- Unusual operating conditions or environmental evidence
  - ALLD fuel spray (Automatic Line Leak Detector)
  - Weeping fuel filters at dispensers
  - Product in any sump (dispenser, tank STP)
  - Damaged or misshapen flexible piping
  - Cracked spill bucket or other sump
  - Stained soil
  - Fuel overflowing out of vapor recovery
  - Sludge accumulation under dispenser
  - Dead grass at fill port

Suspected Release Response Requirements

1. Submit UST-17A form within 24 hours of a suspected release
   - What is the indication of a suspected release?
2. Investigate
   - Investigation Methods may include, but are not limited to:
     - Tank tightness test
     - Line tightness test
     - Site check/soil sampling
     - Meter calibration
     - Hydrostatic test
3. Submit **UST-17B form within 7 days** to document the response activities taken to investigate the suspected release
   - What was the cause?
   - Attach results from investigation
     - Test results
     - Sales receipts, invoices
     - Corrected leak detection results

**Confirmed Release Requirements**

- Fuel release is confirmed if the investigation finds contamination
- Submit **UST-61 form within 24 hours** “24-Hour Release and UST Leak Reporting Form”
- Contact your Regional DENR office
- Conduct further actions as recommended