

## Retail Fuel Tank Fact Sheet

SUBJECT: Above Ground Storage Tanks (AST) vs. Underground Storage Tanks (UST)

1. All major retail fueling companies/convenience stores utilize UST's to store petroleum products
  - a. Buc-cees, Costco, QuikTrip, 7-11, Wawa, Sheetz, etc.
2. [USTs have the lowest sustainment costs](#). Sustainment costs for AST's are 41% higher than USTs.
3. [Since 2015, UST systems](#) must be non-corrodible, designed to be completely secondarily contained and prevent any release of product to the environment.
  - a. Tanks are non-corrodible and double walled. (May be triple walled)
    - i. [Interstice is continuously](#) monitored
  - b. Piping is non-corrodible and double walled
    - i. Interstice is continuously monitored
  - c. All tanks have a sump on top of the tank
    - i. Sumps may be double walled and continuously monitored
    - ii. Sensors are placed in sumps to monitor piping and STP
      1. Sensors alarm or shut down site if fuel touches them
  - d. All dispensers have a sump under them
    - i. Sumps may be double walled and continuously monitored
    - ii. Sensors are placed in sump to monitor piping and dispensers
      1. Sensors alarm or shut down site if fuel touches them
  - e. Entire system is continuously monitored for releases by an Automatic Tank Gauge (ATG) that is connected to the internet.
    - i. AAFES site are remotely monitored 24/7
      1. Local Management and DPW/CE are notified immediately if alarms need local actions
      2. Majority of alarms are remotely resolved
  - f. Operators are required to be trained to operate the UST systems
    - i. Operators perform monthly inspections of equipment and operating conditions.
  - g. Release detection equipment is tested annually by certified technicians
  - h. Offloading areas are contained by spill buckets.
    - i. Spill buckets may be double walled and interstitially monitored
  - i. Fuel drops controlled from overfills by an internal overfill (Flapper valve) and external audible/visual overfill alarm.
  - j. ATG Alarms may be programmed to notify fire department, DPW/CE and/or shut down fueling operations.
  - k. Sites are inspected annually by AAFES Loss Prevention staff
  - l. Sites are inspected at least once every three years by a state certified inspector
4. AST's experience more dramatic swings in temperature than USTs.
  - a. Customers don't get the fuel they pay for or retailer gives away fuel.
  - b. As gasoline warms, it expands by volume but not by weight or energy content.

- i. For consumers in warm climates the expansion of fuel can mean fewer miles per gallon for their vehicles.
    1. Generally, a 15<sup>o</sup> F difference results in a one-percent change in volume.
  - ii. If a Consumer pays \$3.50 per gallon for 20 gallons gasoline at 90 degrees Fahrenheit, due to the thermal expansion of gasoline, the retailer only had to deliver 19.59 temperature-adjusted gallons. The consumer effectively paid about \$3.57 per gallon, not the advertised \$3.50.
    1. A knowledgeable consumer should never buy fuel at a station utilizing AST's to store fuel, in hot weather. ([Generally over 60°F](#))
  - iii. [Temperature fluctuation](#) causes a lack of accuracy in the automatic tank gauge/inventory control system, making leak detection and inventory accounting more difficult and less realistic
5. USTs at gasoline stations [are](#) several feet underground, helping to insulate fuel and keep temperature relatively constant.
6. AST's (including tanks in vaults) are not required by federal law to have:
  - a. Tank leak detection
  - b. [Line leak detection](#)
    - i. Pressurized line leak detection is not available for ASTs if the STP is not activated, even though underground lines are required for retail operations
  - c. Spill containment at fill points
  - d. Overfill prevention
    - i. Spills from a pressurized delivery to an AST are normally more catastrophic than from a gravity fill to a UST
  - e. Regulatory agencies do not inspect or oversee the operation or maintenance of AST's on Federal property.
    - i. Operation and maintenance of the AST system typically becomes complacent or nonexistent without oversight and guidance of regulations
7. AST's should be inspected per [STI Standard SP001](#)
  - a. Visually inspected every month by Owner
  - b. Structurally inspected every five years by certified inspector
    - i. Includes thickness tests
  - c. Inspected internally every ten years by certified inspector or tightness tested every year by a contractor
  - d. This is not enforced at retail gas stations on Federal Facilities
8. Historically, national fire codes did not allow ASTs at retail facilities due to catastrophic events and increased safety risks. Some codes still do not allow fuel dispensing from ASTs at retail sites, but do allow fuel dispensing from ASTs for private fleets.
9. Fire Code requirements for ASTs mandate more land area for tanks and setbacks, restricting traffic flow and complicating design. UST's become part of the parking lot, ASTs cannot.

10. ASTs are visually unappealing and diminish the aesthetics of an installation.
  - a. Any aesthetic fencing must be ventilated to prevent explosive hazards and confined space entry problems.
    - i. Fencing is an AST specific expense to install and maintain over the life of the project.
  
11. ASTs are extremely susceptible to damage by environmental events. Including weather related, seismic, geological, and other acts of God.
  
12. AST's are at a higher risk from human-caused events including, but not limited to, accidental vehicular impacts and [terrorism](#).
  - a. Force protection and antiterrorism are considerations when deciding to install ASTs.
  - b. Where a deliberate decision is made to use ASTs in lieu of USTs, APF should be sought to address anti-terrorism and force protection requirements.
  
13. An AST accident at a retail fuel facility carries a greater potential for major personal injury and property damage due to the likelihood for increased amounts of spillage, fire, explosion, or widespread damage in a mishap
  
14. The tank is the source of a fuel releases in less than 10% of reported releases from an underground tank system.
  - a. Eighty to ninety percent of all leaks come from the lines joining the tanks to the dispensers, and not the tanks themselves, according to [USEPA and State authorities](#).
  - b. Double walled UST's have not been identified as the sole source of many releases.
  
15. AST's reduce competitive contracting for gasoline, adding to potentially higher fuel prices and less fuel availability. There can be significantly higher fuel delivery costs due to the inability to take delivery of gasoline by gravity flow, which results in the need for a special pump-equipped truck or tank system
  - a. Pump Equipped Truck deliveries
    - i. Extra time required to complete delivery process
      1. 95% of all loads are delivered without pump trucks.
      2. Pump truck drivers have to be trained specifically to handle a pump truck trailer to deliver fuel.
        - a. Driver turnover is about 50% per year, which makes it difficult to retain trained pump truck drivers
    - ii. Suppliers increase the cost of gasoline \$.03 to .04 per gallon (\$50 per load) to cover the costs of special trucks and extended delivery times, which increases fuel costs and lowers dividends
    - iii. Pump truck trailers carry 100 to 150 gallons less product per delivery than normal trailers.
      1. Profit on a load is in the last 100 gallons on the truck, which means that all pump truck deliveries are losers
        - a. Carriers are reluctant to take on these contracts
  - b. Permanently installed pumps onsite to pump gasoline into AST's
    - i. Installation cost of pumps on the tanks is expensive

- ii. Incurs further expenses for maintenance of pumps (APF responsibility)
    - iii. Associated lost business during down time
16. Fuel deliveries must be pumped up into the AST under pressure.
- a. Any failure of the pump or connecting hose or line can easily result in injury to customers and workers from filling operations.
  - b. This risk is not present for USTs, which fill by gravity flow.
17. UST's generally have a [30-year warranty](#). Concrete encased AST's have a [20 to 30 year](#) warranty.
- a. Steel AST's have recently upgraded to a 30-year warranty to stay competitive with UST's.
  - b. UST's historically outlast their warranties and there is no documented end of life for a double walled UST.
18. An AST generates more hazardous waste
- a. Any sheen in a containment area is enough to necessitate the treatment of simple rain runoff as a hazardous waste, with all associated protocols.
  - b. Steel ASTs tend to accumulate more water in the fuel, which also becomes hazardous waste when removed. Water removal and disposal = APF responsibility
19. Gasoline pumped out of ASTs for dispenser calibration becomes a serious problem.
- a. There is no simple way to return it to the tanks.
    - i. OSHA problems result if the employee attempts to climb the AST with a calibration can
  - b. Not returning the gas causes inventory problems that can show up as a suspected leak.
  - c. Adding a pump-driven return system is expensive and requires maintenance.
20. Using a stick to check the tanks fuel levels or test for water in the AST's is a safety hazard.
- a. Stick testing the volume of fuel in an AST prior to or after a delivery becomes a hazard for the employees tasked with verifying the amount of fuel in the tanks.
    - i. Must climb ladder or stairway to access top of tank
  - b. "Sticking a tank" is generally the most reliable way to test the tank for water.
21. AST's require more difficult vapor recovery testing.
- a. California is still developing reliable test protocols for Stage II vapor recovery systems involving AST systems.
  - b. Repeated test failures at some installations occur for this reason.
22. ASTs have a greater potential for vapor emission due to increased temperature changes.
- a. EPA recognized this with their change to vapor emissions calculations for ASTs.
  - b. This is another instance of greater environmental damage over a UST installation.

23. Due to the lack of foolproof anti-siphon device or the ability to continuously monitor the STP or piping, ASTs cannot be used for any form of 24-hour unattended fueling.
  - a. AAFES policy ([EOP 36-03](#)) prohibits unattended fueling with ASTs.
  - b. Inspecting and maintaining the anti-siphon valve is an additional expense.
24. ASTs require special SPCC plans written by a PE
  - a. SPCC regulations require secondary containment of the fuel offloading area, which necessitates installing an oil/water separator or a specialized containment area.
    - i. Maintenance, cleanout, and disposal are an APF responsibility.
25. An average 12,000 gallon concrete encased AST weighs approximately 100,000 pounds
  - a. Increases costs in transporting and setting the tank in a new location
26. Exposed concrete outer wall of a concrete encased AST is susceptible to cracking, spalling, and weathering
  - a. Problems that are expensive to correct and are typically not covered by warranty
27. Square AST's have more surface areas that water can pool on, leading to corrosion.
28. AST's in proximity to oceans have increased corrosion rates, requiring more frequent maintenance and upkeep.
29. UST systems provide an optimum mix of environmental protection, fire protection, safety, security, operational capability, and maintenance.

### **Conclusion:**

Outside the gate, professional fuel retailers all use USTs for their fuel storage. To stay financially competitive AAFES has to stay abreast of the competition in the retail fuels field. Sustainment costs of AST's are 41% more expensive than UST's.

Fuel Storage Tanks have to be built for their intended usage. Each fuel storage industry has specialized issues relevant to that field. Building a retail fueling facility to the standards of a Fleet Fueling facility does not make sense.

The UFC standard design for AAFES retail fueling facilities is the use of double walled fiberglass USTs. If ASTs are demanded by the installation, this fact sheet is provided to them so environmental, safety, force protection, and funding trepidations are clearly understood by all. In addition, a waiver of UFC Retail fueling requirements and a special MOU is required delegating the installation and AAFES responsibilities, and is signed by the RE SVP and the installation before the project is approved.

### Notes on APF Responsibility for All Tanks

Army: AR 215-8 establishes that the installation owns the tanks and lines, even if installed by AAFES. The Army is the tank system owner. The leak detection system is part of the

tank system and real property installed equipment. Second, AR 215-1 says that the installation is responsible for funding environmental compliance, in addition to maintenance, repair, and cleanup of tanks and lines. This would include real property installed equipment

Air Force: Support of tanks, including maintenance and repair, is an APF responsibility under AFI 65-106 and AFI 32-7044. AR 215-8 is a joint service regulation and is as applicable to Air Force facilities as it is to Army facilities.

The above provisions in Air Force and Army directives are based on the funding responsibilities for real property and real-property-installed equipment in DoDI 1015.15, Enclosure 4.

Proper allocation of Non-appropriated Funds is subject to the Nonappropriated Fund (NAF) Antideficiency Act, 10 USC 2783.