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PURDUE EXTENSION

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Aboveground Petroleum Tanks

A pictorial guide


DIESEL

Aboveground Petroleum Tanks

A pictorial guide

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Contents

Aboveground Petroleum Tanks

Benefits and Risks of On-Site Storage of Petroleum

Petroleum products such as gasoline, diesel fuel, biofuels, lube oils and engine oils are essential to farm operations, commercial pesticide application businesses, and American commerce. A key question is whether there are alternatives to storing large quantities of petroleum products in aboveground storage tanks (ASTs) at your farm or business. The answer depends on individual operations, types of storage containers used, and personal choices relative to the perceived risks and benefits of on-site storage.

You may feel that the potential for soil contamination, surface and ground water contamination, theft, and vandalism makes on-site storage of large quantities of petroleum products risky. Zoning restrictions, increased insurance costs, reduced cash flow, and significant regulatory controls also must be considered.

It is widely accepted that the lower (bulk) cost and the operational convenience of storing gasoline, diesel fuel, and oil offset any problem potential associated with on-site storage. Quick and easy access, alone, is valuable, as are savings realized by maintaining productivity, i.e., not pulling employees off the job and sending them to pick up fuel. On-site storage also assures timely access to bio-based fuels and off-road diesel fuels that may be unavailable from local retail sources.

On-site fuel storage carries a risk potential that can be reduced by following a set of safety, security, environmental, and regulatory guidelines. The risk is manageable through choosing the best location for aboveground storage tanks, incorporation of good engineering practices, and observance of industry standards.

Poorly managed aboveground storage of petroleum products can be costly. Spills and other consequences of poor management can involve years of cleanup efforts and lengthy legal battles. Issues of concern include the following:

- Soil and water contamination
- Decreased property value due to spills and releases
- Cleanup costs
- Evacuation of nearby neighborhoods in the event of a sizable release


NO
SMOKING

- Theft and vandalism
- Potential for terrorist activity
- Insurance specifications
- High cost of insurance coverage for environmental pollution
- Local, state, and federal regulations, inspections, and enforcement actions
- Adverse environmental audit (may prevent sale of the property)

This publication addresses these potential problems and consequences. It describes field-tested management procedures and security measures to use when storing, dispensing, and disposing of petroleum products. It will raise your awareness of federal and state petroleum regulations that impact your facility. Hopefully, it will motivate you to upgrade management practices at your facility by implementing those that we suggest. Your mishap probability—and your liability potential—will decrease as a result.

Best Management Practices for Aboveground Storage Tanks

The use of aboveground (versus buried) fuel storage tanks has increased over the past two decades, both on the farm and at commercial businesses. This is due largely to the cost—to property owners and insurance companies—of cleanup associated with leakage from buried tanks. When private wells and community water supplies are contaminated, cleanup efforts are extensive and costly, often reaching six figures. Stricter federal and state regulations governing underground fuel storage have resulted.

Properly engineered and installed aboveground tanks have many advantages over those placed in the ground. Leaks are easily detectable and quick to contain. Aboveground tanks facilitate visual inspection and can be painted to prevent corrosion, making leaks less likely. Aboveground tanks can be safely relocated to a different part of the property as circumstances change (e.g., additional building construction; altered traffic flow). Lastly, tanks can be removed when farms or businesses are sold, enhancing property value and eliminating risk to the new owner.

Despite these advantages, aboveground fuel tanks do have drawbacks. Vehicles can back into them, vandals can deface or damage them, and trespassers can steal their contents. They are vulnerable to high winds, flooding, and lightning. Adjacent property owners may consider the pipes and hose apparatus—even the concrete slab on which tanks rest—unsightly.

Shrubs have been planted and mulch applied for aesthetic purposes near aboveground fuel storage tanks.

These tanks have been painted dark green to blend into the landscape. The yellow bollards keep vehicles from hitting them.

Formerly, such concerns guided a trend toward burying petroleum fuel tanks; but, in the long run, tank leakage created environmental problems far greater than any posed by aboveground tanks. More stringent federal regulations subsequently forced many farmers and business owners to switch to ASTs.

Proper management of the risks associated with aboveground storage tanks is essential. Train your personnel to identify and eliminate risks; to conduct routine inspections of fuel storage containers; to dispense fuel and operate pump shutoffs properly; to contain spills; and to conduct cleanup procedures, including the safe operation of equipment. Involve your employees in scheduled reviews of your operation, identifying steps you can take to minimize spills.

The following best management practices provide important strategies for improving petroleum handling operations and safeguarding your property against contamination and theft. Some can be implemented quickly and inexpensively, while others require more time and money.

Examine each picture, carefully looking at the solution to the problem being discussed. In many cases (example below), the picture shown with the solutions has other problems not addressed until later discussions. After reading the publication, go back through each picture to see if you can identify the problems within each picture.

This tank has been painted to discourage erosion. However, notice that its content is not identified. Also notice that the plug to the secondary containment has been removed!

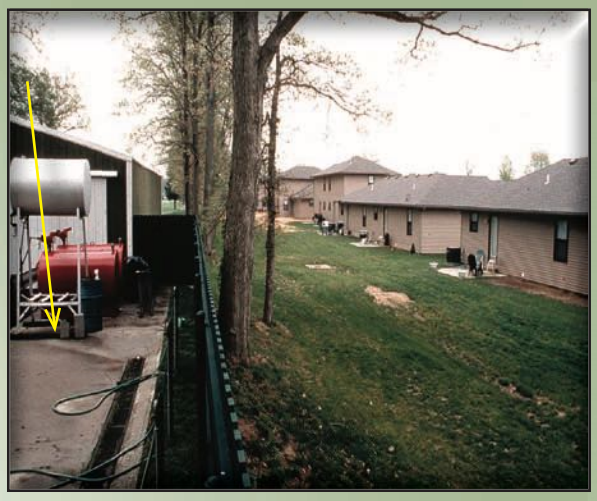
Left: The tank is equipped with a fuel level indicator. Note that 48 inches of fuel is 1000 gallons.

Middle left: Fuel tanks without containment are located near a drain and also near housing.

Middle right: The tanks under roof in the background are installed with proper containment, but the location is far from optimum with a stream so near.

Bottom left: This tank without containment is located beside a pond, leaving little doubt where a spill would end up.

Bottom right: These uncontained tanks are located too near a well house. If a spill were to contaminate the well, years of expensive treatments would be required.



Selecting Tanks

Selection of a proper storage tank for your operation prevents problems. Here are some things you should know up-front:

- A tank intended for outdoor use should have an Underwriters Listed (UL) outdoor-use designation.
- Indoor basement tanks are not intended for outdoor use.
- Tanks designed for flammable liquids such as gasoline should be fire-guarded or vaulted to prevent fuel ignition for two hours during a fire.
- Diesel fuel tanks do not have to carry a two-hour fire rating if the flash point is greater than 100°F.
- A "secondary containment" area must have the capacity to hold the contents of the primary tank, should it fail.
- Double-walled tanks satisfy secondary containment requirements, as do dikes or "bathtubs" in which the primary tank is situated.
- Double-walled tanks are preferable because rainwater is not a problem; conversely, removing accumulated rainwater from dikes can be a hassle.

Every fill-up poses a spill risk, so limit fill-ups to once a month by selecting a tank that will hold a month's supply of fuel. In selecting a tank size, calculate its usable volume, giving consideration to the fact that the pump intake is situated several inches above the bottom of the tank, which reduces the volume of usable fuel. Also, allowing for expansion, tanks should be filled to no more than 95 percent capacity.

When your tank is installed, you will receive a chart for converting inches of fuel in the tank to gallons (Appendix I, page 106). Measure the depth of fuel by carefully lowering a marked dipstick into the tank and removing it. Note the depth of fuel indicated on the stick and use the tank chart to convert inches to gallons. Tank charts are specific to tank configuration, so always use the chart that correlates to your specific tank.

Selecting Tank Sites

Tanks without secondary containment (diking or double walls) should not be placed near lakes, streams, ditches, drains, or wells. Uncontained spills could quickly pollute surface water, impact drinking water supplies, and harm wildlife.

solutions

The area where delivery trucks park to fill the ASTs—the "off-loading" area—should be close to and within clear sight of the tanks. Trucks should not be required to back up or make sharp turns. Tanks should be placed in an area accessible to employees and fuel delivery drivers, but away from the main traffic pattern and not visible from the highway. Bollards should be installed to prevent trucks from backing into the tanks pictured here.

Notice in the lower photo that tanks are not placed above underground utilities nor directly beneath overhead power lines.

Strategies and Recommendations

The placement of ASTs is critical, and the safety of people and property is your primary consideration. Tanks have to be accessible to employees, fuel delivery drivers, and emergency responders but must not be near traffic patterns. They should be located a minimum of 50 feet away from buildings, creeks, roads, wells, power lines, grain bins, and property lines. Do not place tanks where ignition sources such as welding and cutting torches are likely to be used. Avoid roof drip-lines; water may freeze as it flows from the eave of the building onto the tank, or snow may fall from the roof onto the tank. Flat ground is a must so that a spill or leak will not run downhill toward creeks, ditches, tiles, or drains before you can deal with it.

These tanks are situated in flat, open fields. If an accidental release were to occur, it is unlikely that fuel would enter surface water, drains, or ditches.

problems

Placing Tanks On Secure Bases

The importance of placing a tank on a secure base is illustrated in these photographs. An aboveground tank was supported for many years on a wooden base (below). The wood eventually rotted, tipping the tank over and releasing its 118 gallons of fuel onto the ground. This is an example of poor tank placement (near a creek) on a poor base (wood instead of concrete). Notice that the tank would have landed in a creek if it had fallen to the left. Only luck prevented this spill from becoming an environmental disaster.

problems

Above: This tank is leaning left because of soft ground underneath.

Above right: The welded legs on this tank collapsed under the weight of the fuel. Poor tank construction and age were contributing factors.

Right: These tanks were inappropriately mounted on concrete blocks. Notice that the tank on the left is leaning, with the main part of it barely resting on the blocks. There is no containment. Hoses left in contact with the ground deteriorate quickly.

Strategies and Recommendations

Ideally, tanks should be placed on a reinforced concrete pad at least six inches thick; large tanks may require stronger support. Packed stone will support some tanks, but tanks never should be placed on wood or hollow concrete blocks. They should be at least six inches off the ground to reduce corrosion, allow for inspection, and permit painting of the undersides. Tanks should rest on steel supports manufactured for their weight plus maximum contents. The area under and around tanks should be sufficiently impermeable to retain a discharge until cleanup can occur.

solutions

Top: Care has been taken to ensure that the footings under the tank saddles are level.

Bottom: The frame on which this tank rests was designed by the manufacturer; the combination is installed on a level concrete slab.

problems

The fuel tanks in the upper photo are standing on solid gravel, while the tank in the lower photo is suspended on concrete footers with gravel fill. In either case, any leakage likely would go undetected; that is, the fuel would probably permeate the gravel and not be visible.

solutions

The silver tank rests on gravel. The drainage pipe visible in the front and rear of it prevents erosion; i.e., rainwater flows through the pipes and away from the tank, eliminating the possibility of erosion beneath it.

The red tank rests on solid footers; notice the rainwater in containment.

Identifying Tank Contents

Improperly labeled tanks can be a serious issue when an emergency occurs or when employees place the wrong fuel in trucks and equipment.

problems

Top and above right: These large tanks are marked "truck fuel" and "farm fuel." But do they actually contain fuel, or have they been converted for another use?

Above left: This farm tank bears no identification of contents, which increases the likelihood that it could get filled with the wrong fuel.

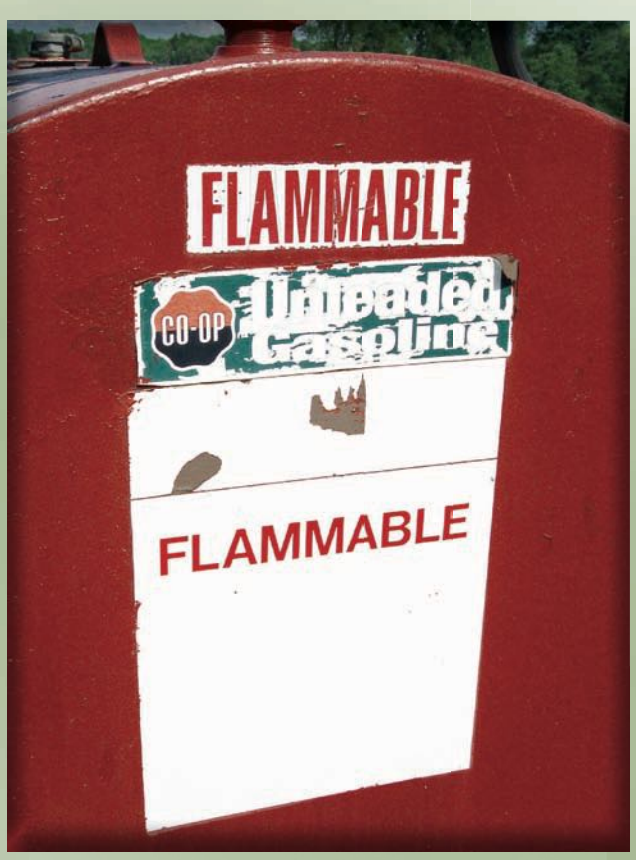
Above and right: These underground fuel tanks are being reused for aboveground storage. Notice the extreme corrosion in the right-hand photo. Tanks previously used underground should never be reused for aboveground fuel storage.

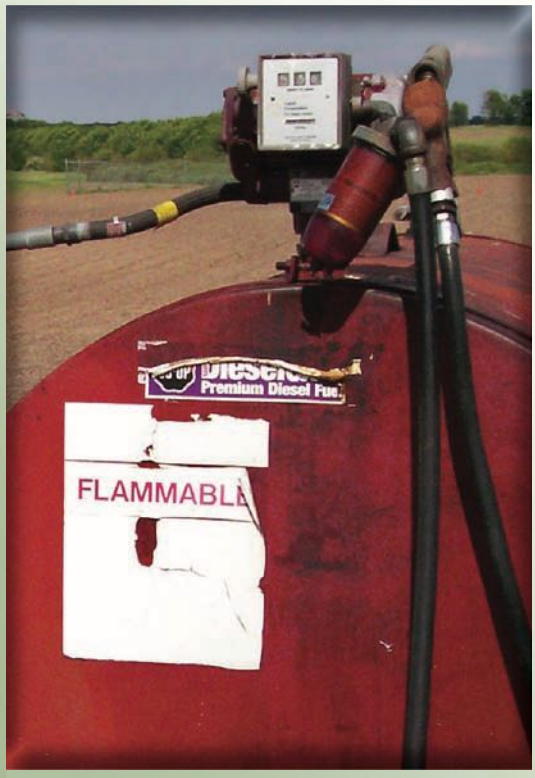
Above: The black indoor tank is being used outdoors.

Right: This plate clearly shows that the tank is manufactured for indoor use only.

problems

problems

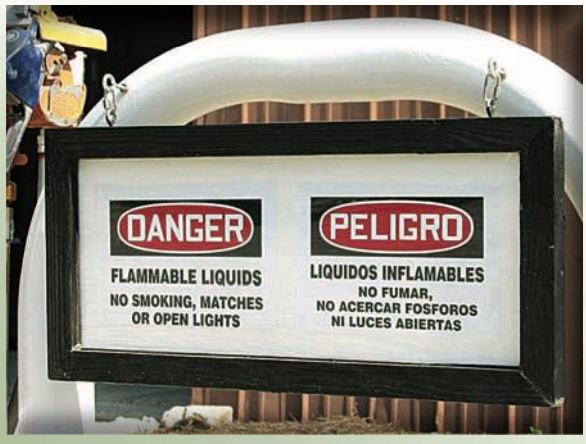




The labels on these tanks are faded and worn—some even partially torn off—making content identification difficult.

Strategies and Recommendations

Proper labeling includes identification of contents, tank volume, hazards, and warnings that ensure the correct fuel is delivered to the appropriate tank, that equipment is filled with the proper fuel (e.g., gasoline versus diesel), that dyed and undyed fuels are used in the appropriate vehicles, and that emergency responders can easily determine what product they are dealing with when responding to an emergency.



Each tank should have clearly visible labels indicating its contents and associated hazards. The Department of Transportation, diamond-shaped placard and the National Fire Protection Association label are good choices. Each fuel tank should bear the words "Flammable: No Smoking." Post danger signs in both English and Spanish. Note that the green farm tank contents are for off-road farm use only.

Product signage should be 5" x 14", with black lettering on a white background. "Flammable: Keep Fire and Flame Away" placards should be 10" x 14", with red letters on a white background. "Dyed Fuel" and "Undyed Fuel" should be 10" x 10", black on white.

solutions

Fuel tank caps can be color-coded to match the tanks.

This tank is marked with large lettering indicating the product type and warning the user about hazards associated with the product.

These tanks rest in rectangular metal dikes to contain spills. Hose nozzles are placed in rain bonnets. A fire extinguisher hangs nearby for handling accidental fires.

The tank capacity is stenciled on the exterior to help ensure against mistakes while loading fuel from the fuel truck.

Preventing Vehicular Contact with Tanks

Sometimes, aboveground fuel storage tanks must be situated in high traffic areas at the farm or business due to limited space or for easy access. But tanks can rupture upon contact with vehicles, leading to expensive remedial action.

problems

Top left, middle left: Vehicles are parked head-on to these tanks.

Bottom left: This tank has been hit by farm tractors multiple times.

Top right: The red fuel tanks are located in the main traffic area. The hoses lying on the ground also are subject to vehicular damage.

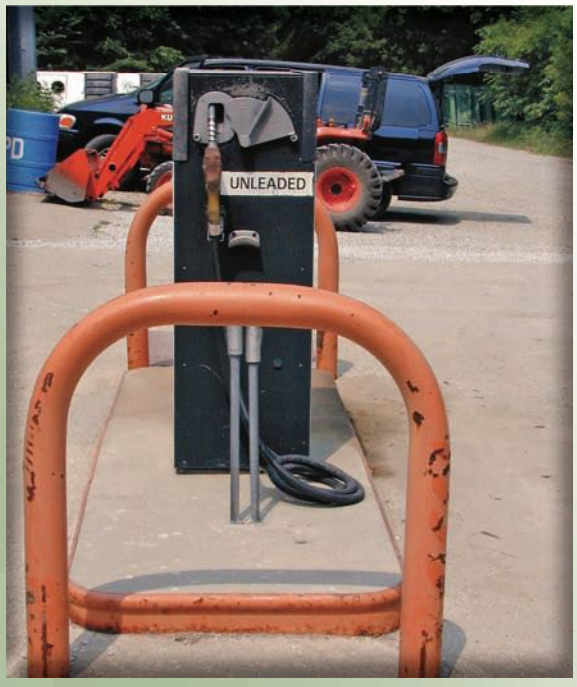
Strategies and Recommendations

Farm managers and business owners all want their above-ground tanks near their base of operations to save time going back and forth for fuel. In most cases, some type of barrier has to be installed to prevent vehicular contact with the tanks.

Barriers can include piping (top right), wood framing (bottom right), concrete pillars (not shown), and concrete wheel stops (bottom left). Curbing is useful for controlling vehicle placement near tanks.

Pipe bollards are commonly installed around fuel tanks (see photos, page 19). They normally are 4–6 inches in diameter; common spacing is 3–4 feet apart and at least 3 feet from the nearest tank.

solutions



These are examples of barriers that protect fuel tanks from vehicles.

Grounding Tanks

Sparks can ignite built-up vapors and lead to disastrous consequences. In this case, the explosion destroyed the aboveground storage tanks as well as the fuel truck. Notice in the bottom photograph how close the tanks are to the home.

problems

An equipment grounding conductor should be installed if electrical equipment is allowed within the fuel storage area. It is important that all electrical connections to petroleum equipment be made with explosion proof fittings and petroleum resistant wiring. Explosion proof fittings also should be used at the electrical panel. The conduits at each end must be sealed to prevent vapor release.

A common practice (and a common problem) is to power the fuel pump by plugging cords directly into an outlet. This can lead to blowing a pump (notice the cord in the water) or simply generate sparks. And thieves appreciate the easy access to your fuel supply!

Strategies and Recommendations

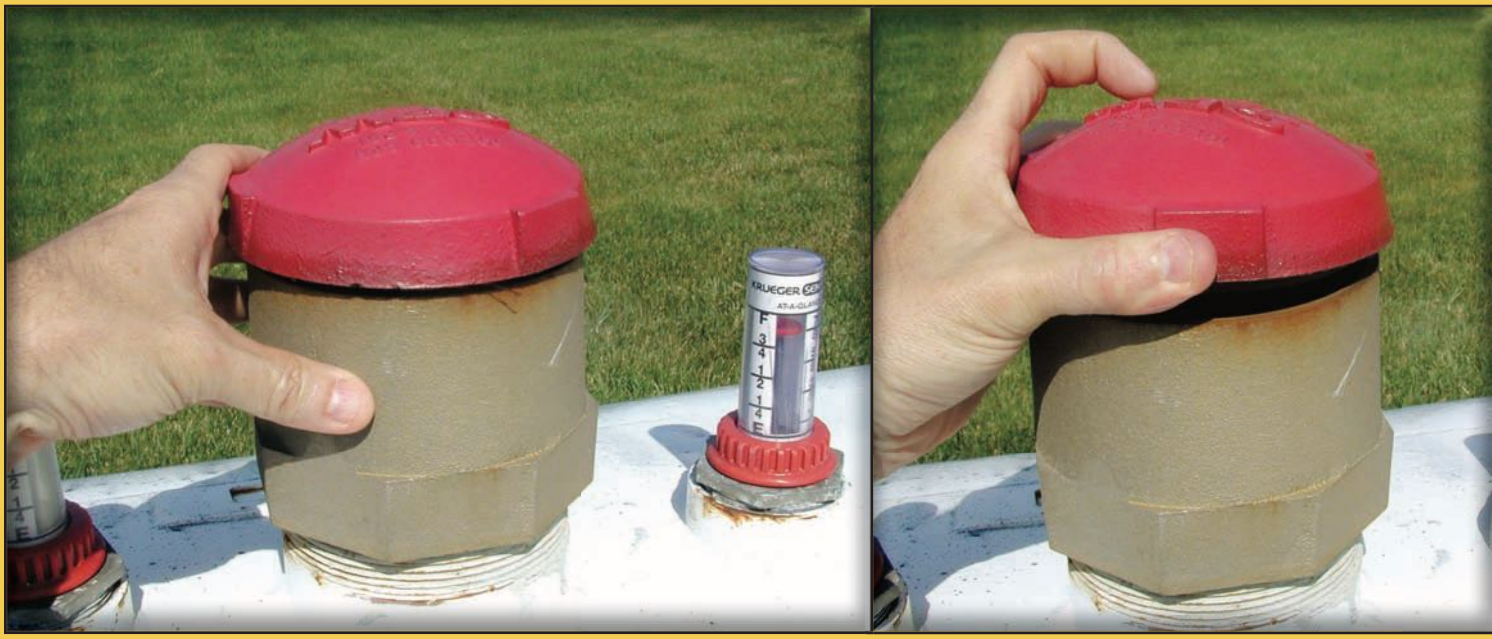
Tanks should be grounded. Some are manufactured with a specific location for attaching the grounding wire. Explosion-proof pumps offer additional protection, but be aware that seal-tite is not explosion proof.

All fittings, whether the union is ½" or ¾", must be vapor proof. An explosion-proof seal is required where the power enters the dispenser and also at the end of the conduit leading to the circuit box. All electrical elements such as conduits and fittings should be explosion-proof; and all wiring should be fuel resistant. The emergency shutoff should be at least 15 feet from the tank, but no more than 120 feet.

The National Fire Protection Association requires explosion-proof wiring methods, including whips to connect motors. Grounding conductors for equipment must have branch circuits. Do not use a metallic conduit for grounding equipment in hazardous locations. Grounding conductors that are not tightly fitted can lose their ground, creating a shock hazard.

solutions

Tall primary vent pipes, compared to short tank vents, allow vapors to dissipate over a larger area, preventing the buildup of vapors around the tanks. Some insurance companies require the taller vents.



The vent with the red cap has a spring-loaded diaphragm, which reduces fuel loss. It opens only at or above a design pressure instead of continually releasing vapors. If the tank is used for gasoline, it should have a pressure vacuum vent cap on the primary vent pipe. This normally is closed so that no vapors are released into the air. If excessive pressure occurs, the vent cap releases at a designated pressure.

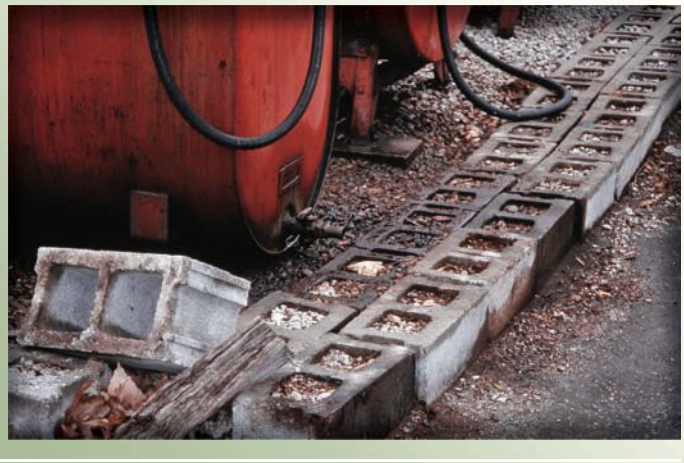
Venting Tanks

Venting is a safety requirement to keep vapors from forming in the tank as the temperature rises; venting allows vapors to escape, decreasing the likelihood of explosion. Aboveground storage tanks should have both primary and emergency vents. The primary vent should be at least as wide as the fuel fill pipe. It should extend above the normal snow level for combustible fuels, or 12 feet aboveground for flammable fuels such as gasoline. The primary vent pipe should be checked regularly for obstructions such as bird and insect nests.

An emergency vent also should be installed on the tank. The most common type is called a long bolt manhole vent; in case of fire, the increased tank pressure lifts the weight, venting the tank. The weight should be lifted manually, periodically, to ensure that it remains free-moving, i.e., to make sure it has not rusted to the tank. Double-walled tanks require two vents, one for the inner tank and one for the outer tank.

This tank under roof is wrapped to deflect heat, helping to reduce vapors.

problems

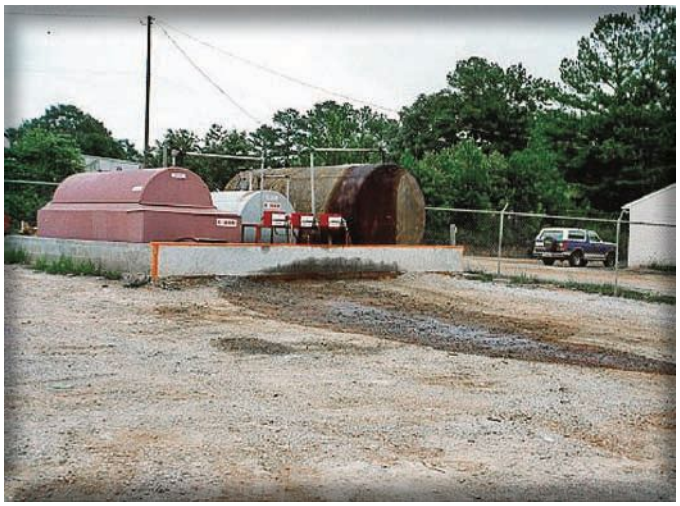


Above: Notice the soil staining in the fuel loading areas. This shows that, over time, the amount of fuel spilled from hoses can lead to significant problems. Notice in the two lower photos that the nozzles are left on the containment wall; and notice the spills around the tanks in the right-hand photo.

Right: In this photo, cement blocks have been used to construct a containment wall. But the voids between the blocks are not sealed; therefore, a spill would not be contained. Cement blocks probably should not be used as containment.

Preventing Contamination Around Aboveground Storage Tanks

Small amounts of fuel spilled when filling equipment, during careless fuel delivery, or as a result of poor management can slowly contaminate the soil. A leak of only one drop per second can release about 400 gallons of petroleum into the environment in one year, resulting in significant soil and ground water pollution. Many insurance policies will not pay for remediation of contaminated soil and drinking water supplies. It is important to review your policy to see what coverage you have. In addition, you must consider that 400 gallons at $3 per gallon represents a loss of $1,200 from your farm or business budget!



Automatic nozzles do not always shut off. Require anyone fueling equipment to remain at the fuel nozzle.

solutions

Above: This diesel tank rests in metal containment.
Below: These fuel tanks are contained in a portable metal dike, which simplifies the clean-up of spills.

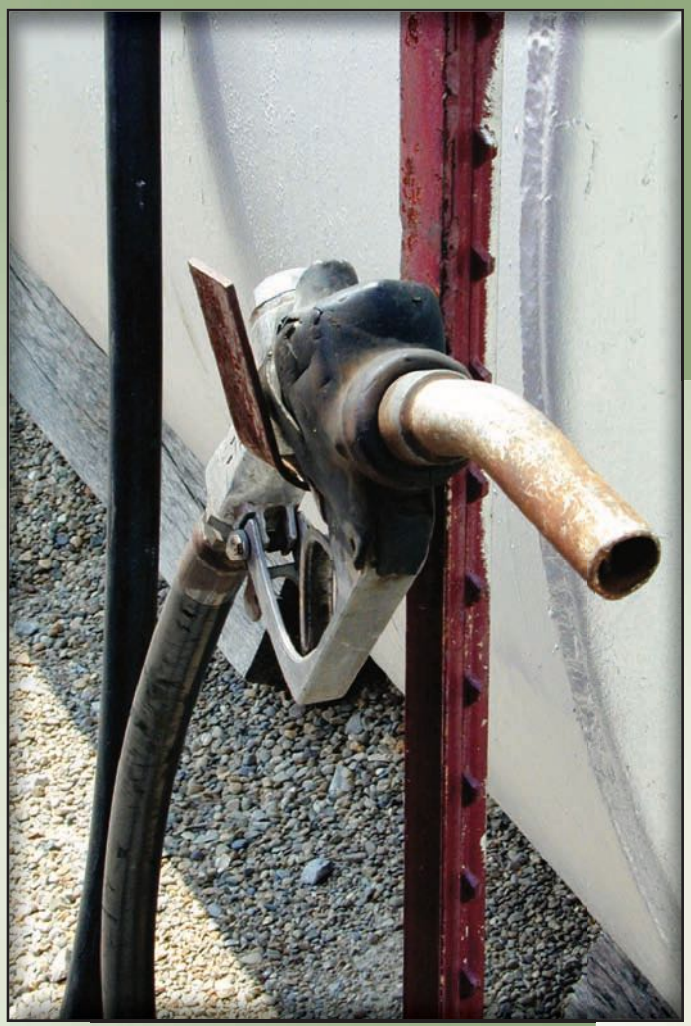
Strategies and Recommendations

Prevention of fuel spills and leaks is the most important management tactic in minimizing pollution liability at your farm or business.

solutions

Concrete containment can have short or tall walls. It must be designed to hold at least 110 percent of the volume of the largest tank.

solutions



Top left: Notice the curbed containment beneath this heating oil tank.

Top right: Containment consists of a wood frame with a synthetic liner.

Left: This nozzle is hung on a steel fence post to prevent dripping.

Above: Although the nozzle is hung within the containment system, the hose remains outside. A leak in the hose would spill fuel onto the ground outside the containment walls.

Top left and right: Notice the 4" x 6" rolled-curve loading pad that contains spills when delivery trucks are unloading or when owner equipment is being filled.

Clean rainwater collected on the pad (top right) is released through a pipe as shown in the two lower photos. The pipe has a valve that remains closed and locked when not in use. Some businesses pass all collected rainwater from containment into an oil and water separator.

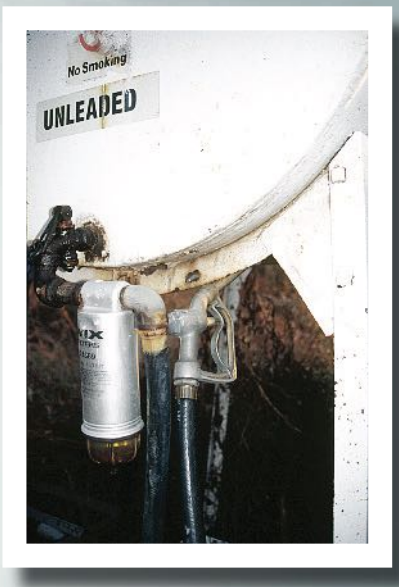
See Appendix III (page 108), a "Weekly Inspection Checklist for Containment Water Release."

solutions

Left: The fill gauge helps prevent overfilling during fuel delivery. Overfill drop tubes and warning alarms also can be installed.

Lower left: This tank and nozzle have been retrofitted with a hole and hook for hanging the nozzle on the tank. In some instances, it may be better to use a high hose retriever.

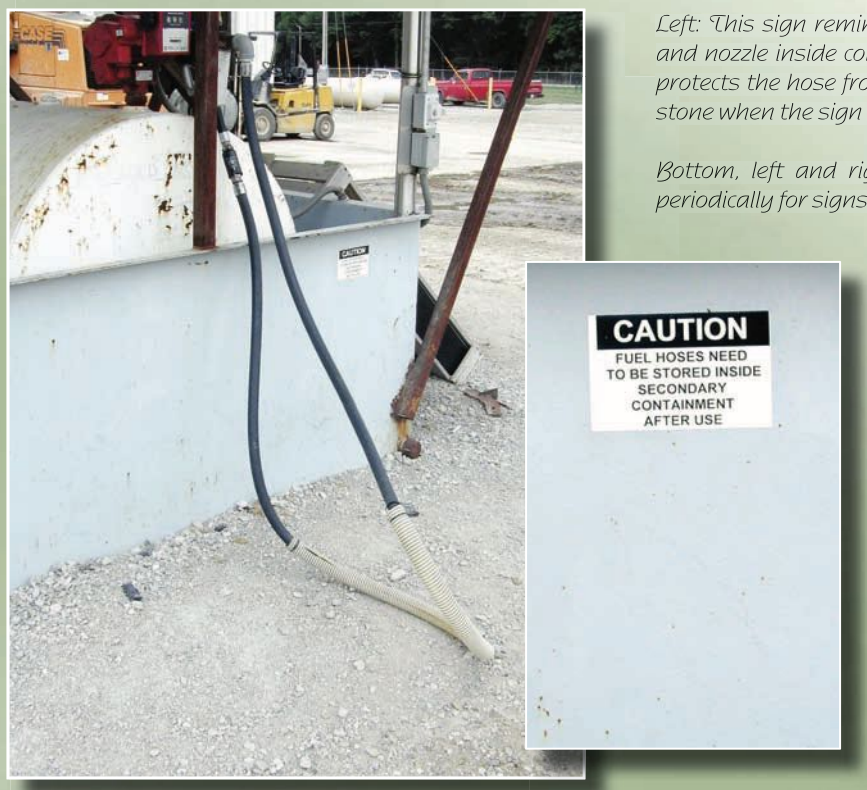
Lower right: A spill basket should be attached to the fill pipe to catch small spills that may occur during tank filling operations. The basket should be kept clean and dry.



This double walled unit is a tank within a tank. The space between the internal tank, which holds the fuel, and the outer tank is monitored by a leak detector that floats when a leak occurs in the interspace. In this case, the internal tank is divided: half the tank holds gasoline, the other half holds diesel. Not all double walled tanks are divided, but this is a good option when space is a concern.

solutions

solutions



Left: This sign reminds employees to place the hose and nozzle inside containment walls. A plastic sleeve protects the hose from wear and tear on the crushed stone when the sign goes unheeded.

Bottom, left and right: Hoses should be inspected periodically for signs of sun rot such as these.

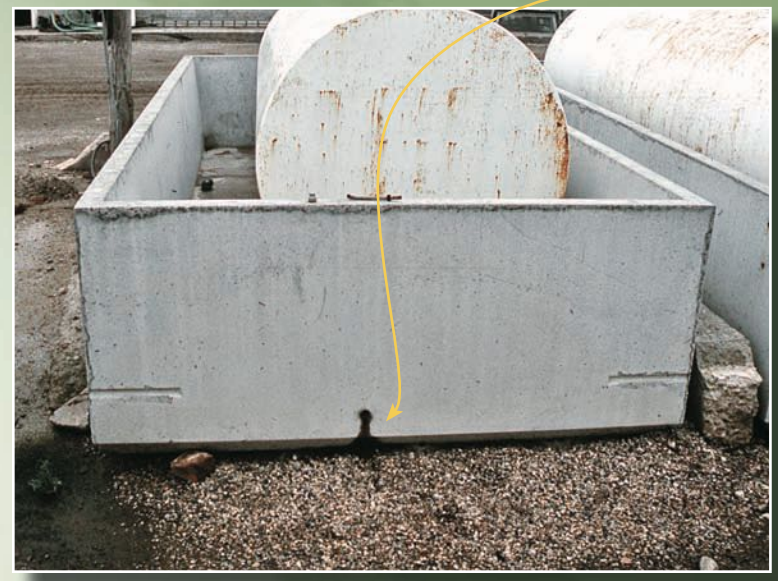
solutions

Top left: A platform provides access for filling tanks.

Middle left: A metal plate protects this hose from abrasion on the rough edges of the concrete containment wall.

Lower left: A whistle vent (ball float valve) is a low cost solution to tank overfills. It attaches to the tank at the base of the primary vent pipe and is set at 90 percent of the tank capacity. The vent whistles during filling until the volume of fuel reaches 90 percent; fueling is stopped at 90 percent to allow for expansion of the fuel in warm weather. Other methods for preventing overfills are automatic shut-off devices and high level alarms.

problems



These metal containment systems had their plugs removed, allowing water to drain. However, since the plugs were never put back, any spill would be released onto the ground. Notice the oily smear below one of the drains (lower left), which indicates the release of contaminated water sometime in the past.

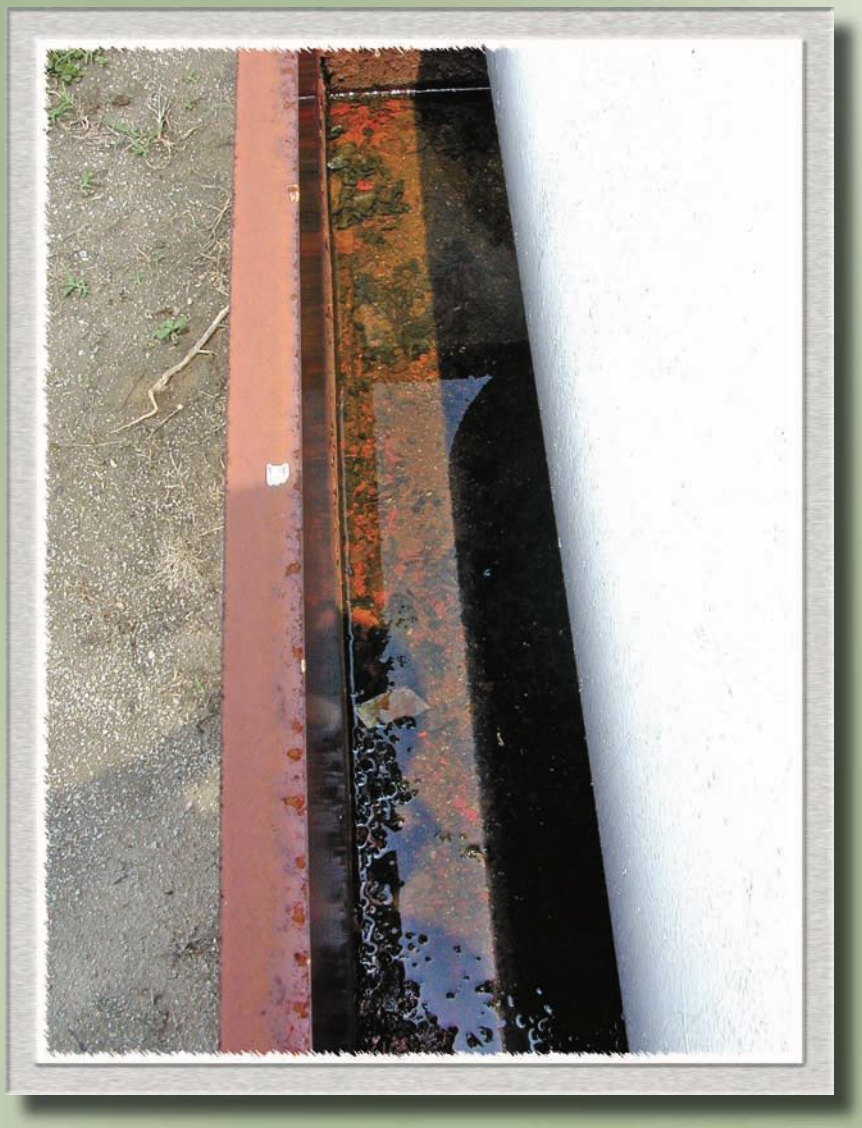
Managing Rainwater Within Containment Systems

Managing rainwater that falls into containment structures presents a difficult challenge. Clean water may be released into the environment, but contaminated water may not. An oily sheen on the surface of contained water indicates the presence of fuel, and separation is necessary before the water may be returned to the environment.

The concrete containment system shown here is well built, the tank contents are identified, and the nozzles are locked when not in use. Nevertheless, there is a major problem. The containment pad has a sump in the back for draining water, but notice in the lower photo that the drain valve is aligned with the exit pipe, which is the open position. This allows water—and any spill that might occur—to drain immediately, which defeats the purpose of the containment facility. Also, notice that the paint on the right-hand tank has eroded down to the primer.

problems

This is an overhead view of a metal containment tank, showing rust caused by standing rainwater. In addition to causing rust, standing water decreases the volume of released fuel the structure could hold if a spill were to occur. The farm or business owner should install a drain for releasing water after rainfall. All containment facilities should be owner-inspected on a regular basis to identify potential problems.



Strategies and Recommendations

It is important to release clean water from containment as soon as possible after a rain. The longer it stays contained, the greater the opportunity for it to become contaminated with fuel (e.g., from a nozzle). In addition, corrosion may begin on the tank's surface or supporting structure, compromising its integrity. And the volume of rainwater decreases containment capacity for petroleum in the event of a spill.

Ideally, rainwater should be released from containment through an oil and water separator, which is a device that traps the oil and releases the water. The separator must be sized for the anticipated flow volume, and it must be cleaned periodically.

Keeping the containment area empty not only protects the tank but also prevents future fuel spillage from contacting clean rainwater. In this example, rainwater from containment flows through the drain, back into the environment. The drain must be closed as soon as the water is emptied. It is recommended that an electric solenoid valve be used to reduce the chances of the drain being left open. The valve should be locked, and only authorized personnel should be allowed to unlock it. Always keep records of drain activities.

solutions

Strategies and Recommendations

You can purchase materials to absorb spilled fuel. Some types absorb petroleum only, while others absorb water and coolants as well. Always keep a spill kit at each fuel tank location. Contents should include absorbent pads, pillows, and socks to contain and recover spilled fuel. If your tank is located within a containment dike, it is important to have pads that absorb oil only. These float on the surface of contained water, absorbing spilled fuels prior to the release of the water.

Preplanning for a spill reduces its environmental impact—and probably the cost of cleanup. The product you choose should be available at the fuel storage site. After the absorbent is saturated with the spilled product, store it on plastic and keep it out of the rain. Put plastic beneath the saturated absorbent even if it is stored on concrete; otherwise, the petroleum could be absorbed by the concrete, causing additional contamination and cleanup. Vapors escaping from the saturated absorbent can be a fire hazard, so be sure to properly dispose of the material as soon as possible. Small amounts of used absorbent can be double bagged in plastic trash bags to await disposal, but always check local regulations.

solutions

Your spill kit should contain enough materials to handle a typical spill. It does not have to be purchased; that is, you may use a covered drum or tote with a couple of bags of oil dry, a dust pan, and a broom.

Spill kits often contain materials of different shapes: pads, socks, pillows, etc. Each product is color coded. Blue/gray is universal for absorbing water, coolants, and oil. White absorbs oil and fuel only. Yellow and pink absorbent pads are designed for hazardous chemicals.

solutions

Covering tanks eliminates most rainwater concerns and reduces fuel loss due to evaporation. The upper left-hand photo shows a cover that should have a vent at least 3 feet above the roof and at least 12 feet above grade. The open air, shed type covers in the other three photos are better because they do not trap potentially explosive vapors.

Above: Large diesel tank in containment.
Upper right: Same diesel tank as above, showing adjacent gasoline tank in containment, under roof.
Lower right: Gasoline tanks in containment, under roof.

solutions

A and B: A pipe is used to plug a discharge hole; water is released by pulling the pipe out.

Bottom left: Make sure that any flow control valves remain in the "off" position except when releasing clean rainwater.

Bottom right: The tank within a tank, also know as a double walled tank, is the ultimate solution for preventing rainwater from contacting petroleum products. Water never touches the fuel, nor does it accumulate within the containment system. This photo depicts the ideal setup with well marked, double walled tanks sitting on a concrete slab; the entire system is protected by pipe bollards.

General Maintenance

Simple maintenance items often get forgotten. Tanks need to be repainted and weeds need to be removed.

In the two top photos and the lower left photo, paint is beginning to peel and the tanks are rusting, which reduces their strength. The lower right-hand photo shows vegetation growing around and beneath the tanks, which could cause fire and safety issues. Weeds and grass can disguise a spill; and in cases where there is a containment floor, their root systems can compromise its integrity. Vegetation facilitates moisture reaching the tanks, accelerating rust.

solutions

Top: A good primer protects this fuel tank and helps control the temperature inside, reducing losses due to evaporation.

Center: Weeds are controlled near these tanks.

Bottom: A dumpster for trash helps keep debris from accumulating around these tanks. Ideally, it should be at least 25 feet away.

Monitoring Fueling Operations

You are responsible for spills made during the delivery of fuel to your facility. It is advisable to be there or assign an employee to monitor fuel delivery to ensure the following:

- The correct fuel is placed in the tank.
- The correct amount of fuel is dispensed (calculate beforehand to prevent overfill).
- Spills are cleaned up immediately.

Order enough fuel to fill the tank to 90 percent (.90) capacity. Use this formula to calculate the amount:

(tank capacity in gallons x .90) – gallons of fuel in the tank = maximum amount of fuel to add

The photo directly below shows a fuel delivery without personnel present.
The lower left photo shows avoidable fuel spills. When spills do occur, they should be cleaned up immediately.
The right-hand photo shows a stick for measuring fuel tank contents.

Facility personnel who monitor fuel delivery must observe the entire process and remain attentive. They are responsible for directing the delivery person to stop the flow of fuel in the event of a leak, spill, or unusual occurrence. They also must ensure the following:

- The spill basket is emptied and cleaned, prior to fuel delivery.
- Spill response materials such as socks, absorbent pads and pillows, and drain covers are within reach.
- The correct petroleum product is delivered.
- The delivery person knows how much fuel is needed to fill the tank to 90 percent capacity.
- The delivery person is aware of drains and other surface water features prior to filling the tank.
- The delivery person knows what type of overfill device is on the tank and what action to take if it activates.
- The tank is never overfilled (by calculating and confirming the amount needed).
- No one smokes within 50 feet of the fuel delivery truck, its hoses, and the tank vents.

Fuel delivery personnel are responsible for proper hook-up and for stopping the fuel flow instantly if necessary.

Once the tank is filled, delivery personnel are responsible for disconnecting the hose, securing all ports, and verifying that the correct amount of fuel has been dispensed (by re-measuring). Facility personnel should then verify that the spill basket is empty and return all spill control materials to their storage location.

Employee Training

All farm or business personnel who pump fuel should be trained on good fueling procedures. They should know how to use all spill kit items, how to prevent overfills, and how to react if an emergency occurs. Hands-on training usually is better received and remembered than training from written materials.

Spill prevention is the single most important thing, and periodic refresher training should be provided. Employees need to be reminded of routine filling procedures such as turning pumps on and off, locking tanks, inspecting hoses and fittings, and completing the use log; and they must always be reminded to stay present at the tank when fueling.

Detecting Water in Tanks

The accumulation of water in tanks can cause them to rust on the inside. It is a good idea to check stored fuel for water content by using a special paste on a dipstick. The paste changes color if water is present. If water is detected, contact your fuel company and ask them to remove it.

A water-finding paste is rubbed onto a dip stick which is then lowered into the fuel tank through the fill pipe. The paste changes color if water is present.

Inspections

You should perform thorough monthly inspections of your storage tanks and keep documentation of the inspections for two or three years (federal regulations). Deficiencies noted during the inspection should be corrected as soon as possible.

Your inspection should include at least the following:

- A visual examination of the tank system for deterioration, including but not limited to the tank and its coating, hoses and fittings, pipes, foundation, and drainage mechanism.
- A dipstick inspection of tank contents, at the lowest point, for the presence of water.
- A check of the interstitial space (i.e., the space between the walls) of a double-walled a tank for accumulation of fuel or water.
- Confirmation that all drain valves are securely closed when not in use.
- An inspection for accumulation of water or fuel in the containment area.
- A check of the spill basket to make sure it is clean and functional.
- A check of normal and emergency vents for obstructions or restrictions that could interfere with proper operation.
- A check of auxiliary equipment for operational malfunctions.
- An investigation of conditions that may pose a fire, safety hazard, or environmental hazard.
- A search for evidence of a release from the tank system.
- Confirmation that spill kits are immediately accessible.

See Appendix II (page 107) for a tank inspection form called "Monthly Checklist for Aboveground Storage Tanks."

Plan A Walk-Through with Firefighters

Contact your local fire department and first responders to schedule a tour of your fuel storage facility. Develop an emergency response plan that you can give to the local fire department. See PPP-64 for more details on how to develop your map.

Indoor Gasoline Storage

Many companies use 5-gallon gasoline containers to fill their equipment. Such containers must be managed to reduced the threats of fire and theft.

Strategies and Recommendations

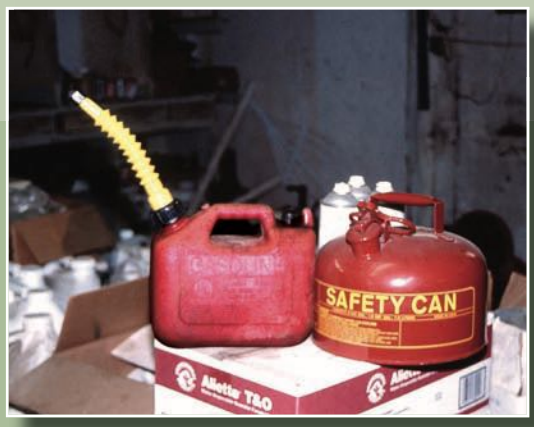
Limit the quantity of gasoline stored indoors. Consult your insurance agent to determine if your coverage hinges on a specified quantity.

problem

Left: The plastic containers in this photo are designed for non-commercial use; they are not appropriate for business use. And the cabinet is left unlocked!

Below: The gas can on the right side of the photo is a UL Listed, heavy duty metal gasoline can equipped with a pressure release valve. It is ideal for storing a small quantity of gasoline indoors; however, it should be stored away from pesticides. Always label containers of petroleum to identify contents.

solution



solutions

Top: Use properly labeled, fireproof storage cabinets for indoor gasoline storage; remember that ventilation is a must when storing fuel indoors.

Middle: The yellow fireproof cabinets are ideal for storing gasoline indoors.

Bottom: Notice that the cabinet is too close to an electric compressor; this raises safety concerns significantly.

Handling Oil Products and Filters

A clean work area means a safer environment for employees. Your efforts to maintain a good working environment will result in fewer employee injuries and fewer worker's compensation claims.

problems

When oil containers are handled improperly, they can cause contamination. One quart of motor oil can pollute 250,000 gallons of water.

Upper left and right, middle left: Minor spills should be cleaned up immediately; otherwise, they send the message to employees that some spills are acceptable.

Lower left: Waste oil from a mechanic's shop is dumped into an inside drain that empties onto the ground outdoors.

Below: A bucket full of waste oil sits outdoors without a lid. There is a ditch just on the other side of the fence.

problems

Top: Leaks and spills are evident inside this facility.

Middle: A spill that occurred in this shop flowed outside because no one bothered to clean it up.

Bottom: This is a good example of a bad situation. Always drain oil filters and containers before throwing them in the trash.

Strategies and Recommendations

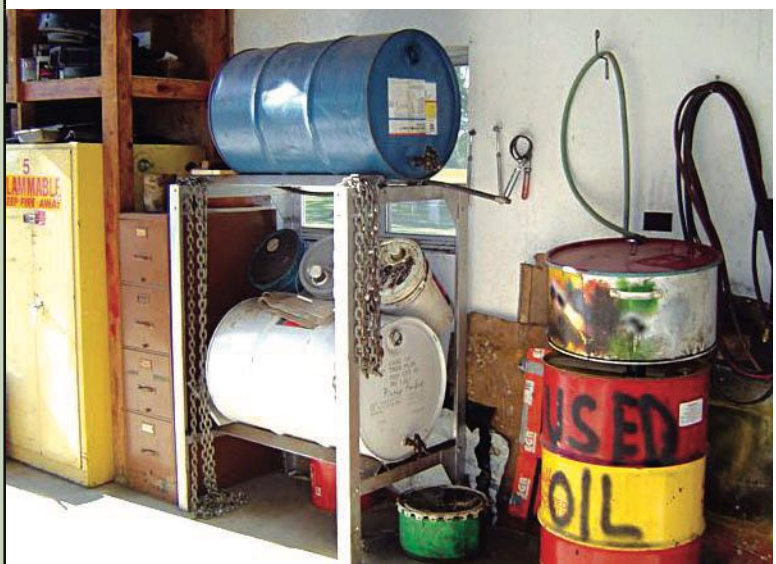
Many farmers and business owners maintain and repair their own vehicles and equipment. Their attention to detail in preventing spills, storing and ultimately disposing of used oil, and cleanup of any mishap along the way is extremely important. Good housekeeping is a vital component of good oil management.

In these photos, oil containers are placed along the wall, out of the way.

Upper left: The drip pan has holes that allow oil to drain into buckets.

Upper and lower left: Oil barrels are placed on racks.

Lower right: Drip buckets catch any oil that drips from the spigots.



solutions

solutions

Upper left: Oil barrels, used oil, and equipment are stored over containment. Notice that the funnels hanging on the wall have drip cans below them.

Upper right: The oil can is hung to drain into a drip bucket.

Lower left: Notice the electrical outlet on the wall near the oil storage barrels. This combination becomes a fire hazard when the outlet is in use. That is, the outlet becomes an ignition source when something is plugged into it.

Lower right: This unit provides secondary containment for two, 55-gallon drums; it also protects the drums from rain.

solutions

Upper left: The drums are stored over containment, and the contents are clearly identified.

Upper right: The outside sight gauge is not a good idea. Wind and sun deteriorate the plastic hose, and any break in the hose allows fuel to leak onto the ground. A better choice would be a float gauge installed through an opening in the top.

Lower left: Used oil is collected and stored for recycling. Keep records showing the name and used oil hauler license number of the person who picks it up.

Lower right: Consider recycling used oil. Buckets should be labeled and should have lids.

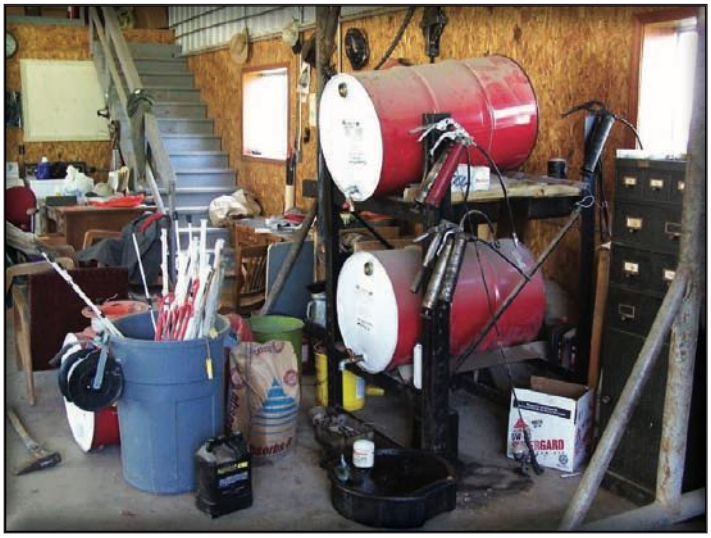
Oil storage containers of all sizes must be labeled. The photos above show a 5-gallon bucket and a 55-gallon drum; the tank in the background photo holds thousands of gallons. All three sizes are labeled to show that they contain used oil.

Notice that the blue trash can above holds drained oil filters being saved for recycling.

Label too small for size of tank → USED OIL

solutions

Oil filters must be drained as completely as possible. They should be hot drained for 12 hours, immediately following removal. This gets them as clean as possible, preventing used oil from entering the landfill. Oil filters may be recycled, or they may be thrown in the trash after draining.



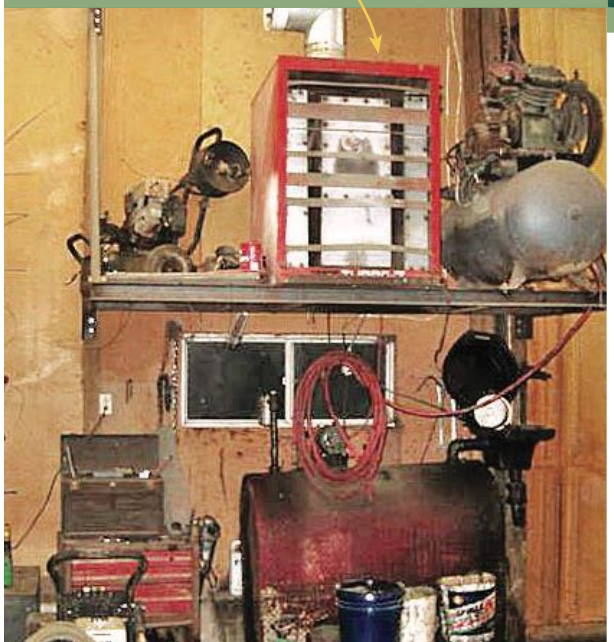
solutions

This is an ideal oil collection and recycling system for used oil.

Above: The drums of new product are on a base with wheels that make it easy to move. The used oil can also is on wheels.

Right: Funnels and containers are turned upside down to drain.

Below: Used oil is recycled to run this shop heater.



problems

Unattended tanks make easy targets for vandals and thieves.

Bottom left: This unsecured cap is an open invitation to intruders.

Securing Tanks from Attack by Vandals and Thieves

Storage tanks that are visible from the road or highway are vulnerable to vandals and thieves. Vandals may slash the hoses, releasing fuel onto the ground, or pollute the tank contents; thieves may simply help themselves to a tank of gas.

Left: Thieves can access fuel by cutting the switch lever to turn on pumps. This photo shows an incident that took place before it became routine to shut off the power inside buildings. A padlock designed to resist bolt cutters is recommended.

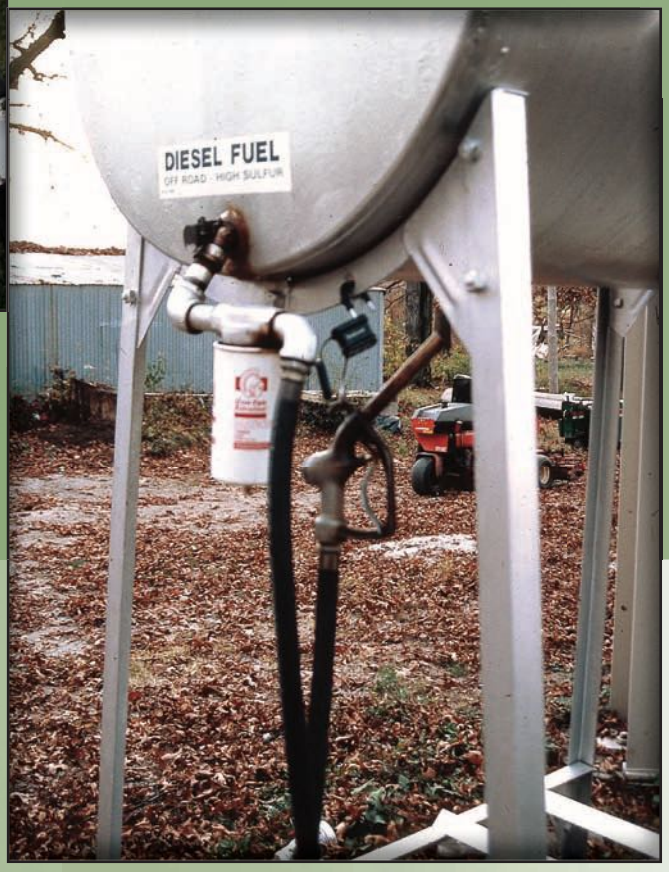
Bottom left: Thieves broke into a building, turned on the power at two locations, and then broke the switch housing to get power to the pump.

Bottom right: Sometimes theft is difficult to prevent. Thieves unscrewed the filler pipe and a cap that was locked, then siphoned the fuel or used a portable pump to remove it.

solutions

Strategies and Recommendations

There are various strategies for protecting unattended tanks, starting with a good padlock. Expect to pay a good price for a superior lock that can withstand a blade or bullet.



solutions

A series of locks and methods used in combination can greatly deter a thief. Nozzles as well as outside pumps and switches should be locked. Indoor switches should be turned off when not in use. The fuel pump breaker can be turned off at the main box; and if your breaker box has a hinged lid, it also can be locked.

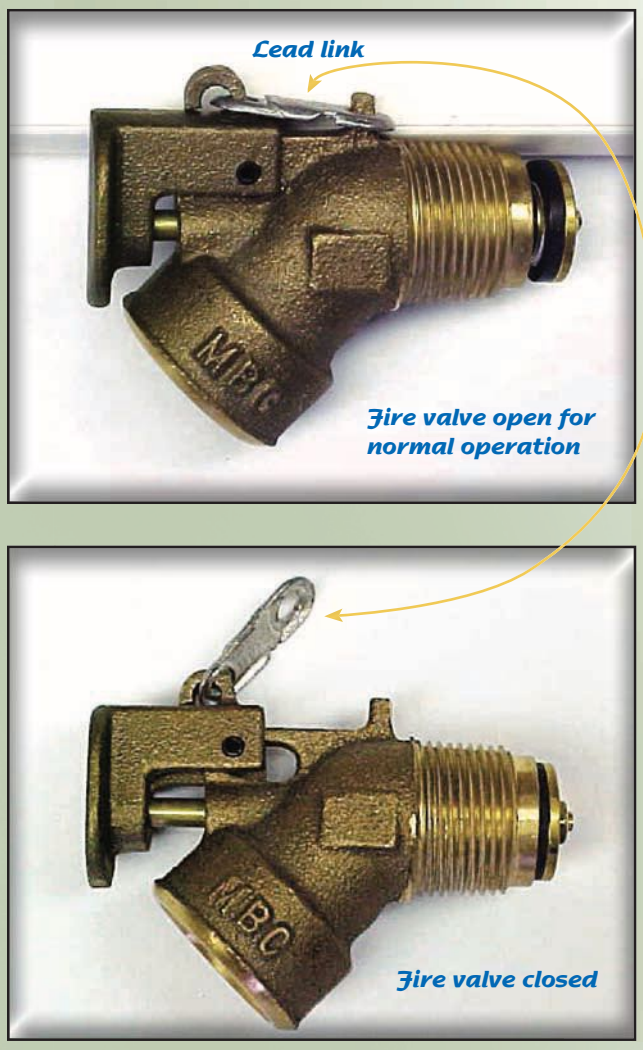
Timers can be used to control electricity to your fuel pumps. If you place them inside a building, choose a secure location and padlock the cover. They may be placed inside a vandal-resistant enclosure located a safe distance from the tank.

solutions

Below: The strobe light signals employees, security guards, and local police that someone is tampering with these fuel tanks. Mounting the strobe high in the air makes it visible from longer distances.

Bottom left: This light indicates that the pump is on. Any light mounted on a pump must be explosion-proof. Make sure that listed seal off fittings are properly installed on conduits supplying power to lights, receptacles, and pump motors.

Below: Fire valves are required. During a fire, the lead link melts at a low temperature, allowing the valve to close; if the tank hose burns off, the valve will be closed. After fueling a vehicle, the link can be manually released and the valve will close. A padlock can be used to secure it.



Top two photos: A special key is required to access the pump for this tank. Keys may be assigned to management personnel and/or a limited number of trusted employees.

solutions

Left and below: These are more examples of special keys assigned to employees.

Below: This tank has a health and safety decal clearly displayed.

Locking the fill portal and power supply makes it more difficult to steal fuel. These photos show examples of quality locks that will enhance your farm or business security.

solutions

Fencing helps to secure aboveground storage tanks. Some business owners fence their entire property (directly above).

solutions

Left: Keep a log of the fuel dispensed from your tanks. This will enable you to calculate the amount missing in the event of theft.

Below: Security lighting around your fuel tanks deters thieves; it also can aid in the discovery and cleanup of spills. When considering lighting, request vandal-proof glass. The product stored and tank location also may enter into your decision.

problem

Flooding can wash away aboveground storage tanks or turn them over. But in the lower photo, the AST is anchored to a concrete base, keeping it securely in place.

solution

Prepare for a Petroleum Emergency

Emergencies do happen. Extreme weather conditions and human interference—intentional or accidental—are the two main causes. In any case, you want to be ready. The chances of minimizing your loss increase with preparedness and are enhanced by the quick, appropriate response of your local emergency personnel. Think about what *could* happen. What *might* happen. Think about how to react and whom to call after 9-1-1.Write things down. Develop an emergency plan. Include telephone numbers for reputable spill cleanup contractors so that cleanup can begin as soon as possible.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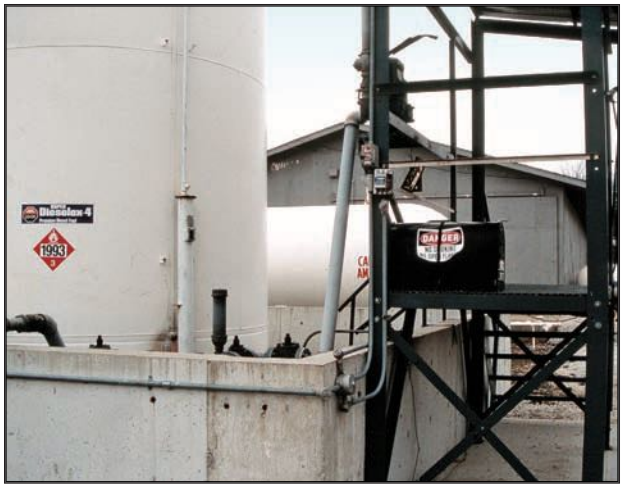
3101

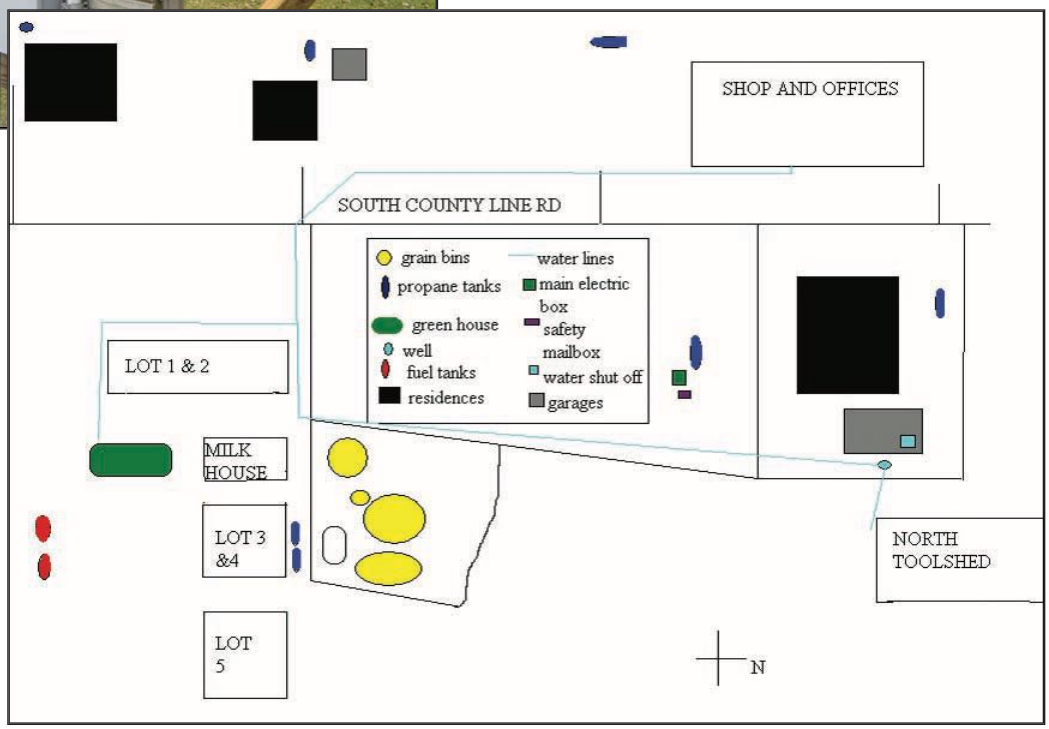
solutions



Left-hand page: An aerial photograph clearly shows fuel tanks, buildings, grain bins, and other farm structures. This type of photo greatly assists first responders during an emergency.

Left: Notice the emergency mailbox near the fuel storage and containment facility.

Lower left and below: This is another emergency mailbox, along with the emergency map it contains. Notice that this map is color coded to make it easier to read.



solutions

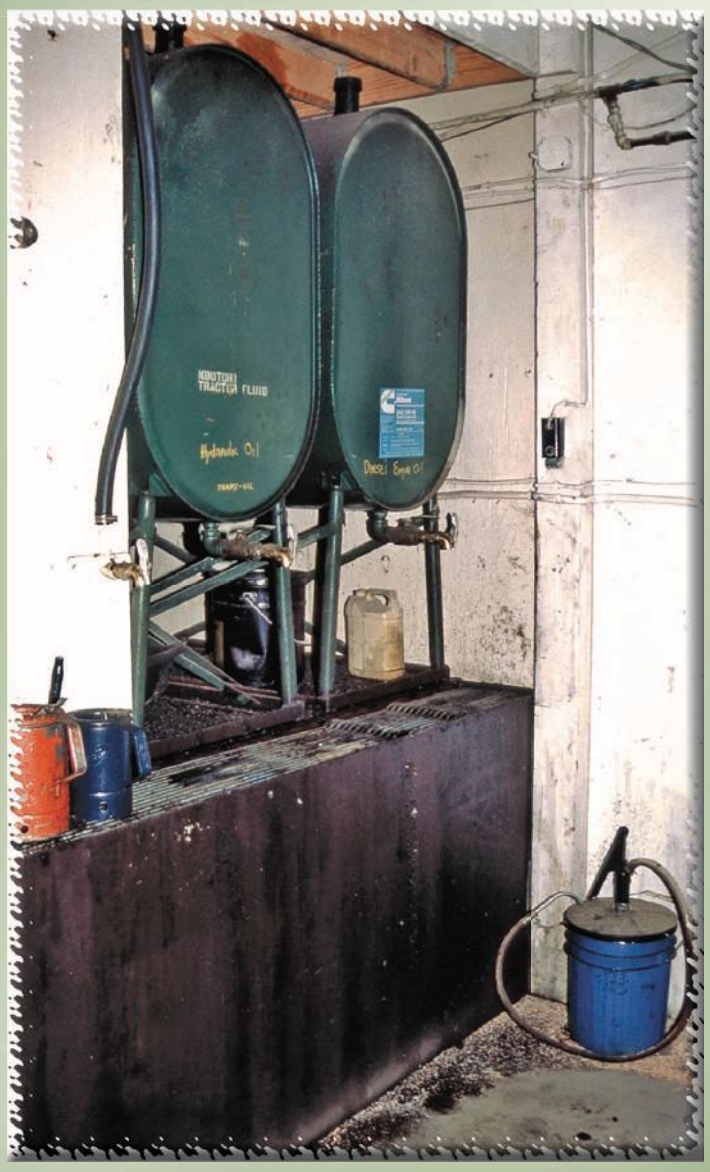
Placement of ABC, all purpose fire extinguishers near aboveground storage tanks and in buildings can help prevent minor fires from becoming major.

Fire extinguishers must be inspected monthly, and the importance of these inspections cannot be overemphasized. Fires often occur during busy farming seasons when equipment is hot while refueling. The risk of a fire caused by overfilling is greatest at this time. A well maintained fire extinguisher can save your machinery—possibly your life!

Clearly marked emergency shutoffs are essential; once a release is in progress, it is important to stop the fuel flow as soon as possible to prevent further contamination of the surrounding environment. Shutoffs should be at least 15 feet from the fueling area, but not more than 120 feet away.

Right: This alarm system is triggered when a spill occurs.

solutions



If you have indoor oil tanks, notify your local fire department personnel; this information could be very important to them, should a fire occur. Place fire extinguishers in close proximity to indoor tanks.

Note: Emergency vents for Class I, II, and III liquids shall not discharge inside buildings, according to state fire code regulations.

Aboveground Petroleum Tank Regulations

Petroleum regulations are written to protect people, property, and the environment. The regulations often require the following:

- Tanks must be constructed according to engineering specifications and industry standards.
- Tanks must bear product identification and warning signs.
- Tanks must be secured and in containment.

Petroleum regulations not only protect private property and enhance personal safety, they are designed to augment public protection measures at all levels of government. For instance, a business may be required to notify various government agencies if their petroleum storage exceeds a specified threshold. These individual reports alert emergency responders to prepare a plan for accidental petroleum spills, natural disasters, and fires; and they allow fire departments and other officials to establish plans for handling intentional petroleum releases by vandals or terrorists. Pre-planning facilitates a more coordinated effort to protect the public. Many regulations also are best management practices that you should follow even if not required to do so. You should review all of these to make your aboveground storage tanks as safe as possible.

The following sections describe regulatory triggers

that place a farm or business under the auspices of each regulation. Additional details on regulatory compliance can be found in The Complete Federal and State Compliance Guide to Hoosier Businesses at http://www.btny.purdue.edu/ppp/ or by contacting specific agencies.

Key Terms

Vapor: a visible exhalation of gas, like a mist, suspended in air.

Flash point: the lowest temperature at which a liquid petroleum product can release sufficient vapors to ignite.

Flammables: products capable of catching fire at flash points below 100°F.

Combustibles: products capable of catching fire at a flash point of 100°F or above.

The correct interpretation of petroleum regulations hinges on a person's understanding of the four terms broadly defined above. All petroleum products release vapors, some sooner (i.e., at lower temperatures) than others. The amount of vapor released into the atmosphere is temperature driven: more vapor is released at higher temperatures, less at lower temperatures. The amount also depends on the chemical and physical properties of the petroleum product.

Emergency responders are interested in flash points. Gasoline has a flash point of -45°F, while the flash point of diesel fuel is 105°F. So gasoline is more flammable than diesel at normal temperatures.

Petroleum products fall into one of two groups categorized by flash points. Products with flash points below 100°F are categorized as flammables, while those with flash points of 100°F or above are categorized as combustibles.

Flammables are Class I materials, subdivided into Class IA, Class IB (gasoline), and Class IC.

Combustibles are Class II and Class III materials. Class II materials such as heating oil and diesel fuel have lower flash points (100°F to 140°F), while those of Class III combustibles range from 140°F to 200°F.

The differences between flammable and combustible liquids determine the areas of regulation: tank construction and ventilation, maximum fuel volume to allow for vapor expansion, separation distance between aboveground tanks and buildings, and identification tags and warning signs on tanks.

Petroleum vapors are heavier than air and tend to settle near the ground on a calm day, so the regulations address the reduction of vapor accumulation. They define how tall the tank vents need to be to help dissipate vapors; and they state management practices that can reduce ignition sources such as sparks from metal-to-metal contact from a nozzle being inserted into a tank, contact with electricity, or contact with a live ash or cigarette butt.

Spill Prevention

The federal Spill Prevention, Control and Countermeasure (SPCC) Regulation (40 CFR Part 112) addresses farms and businesses that store more than 1,320 gallons of oil or oil products in aboveground storage tanks/containers. "Oil" includes, but is not limited to, the following products: waste oil, used oil, heating oil, diesel fuel, kerosene, gasoline, crop oil, adjuvant oil, lubricating oils, naphtha, mineral spirits, vegetable oils, animal fats, and blends such as biodiesels; synthetic oils are also regulated as oil or oil products. Some of the things required by the SPCC regulation include appropriate secondary containment and/or diversionary structures, security measures, inspections and recordkeeping, and employee training. Its primary goal is to prevent oil from being discharged into or upon surface waters or adjoining shorelines of the United States.

The SPCC regulation is based on the total oil storage capacity of all on-site storage containers that can hold 55 gallons or more. All aboveground containers (tanks, drums, totes, etc.) 55 gallons or greater are included, even if empty. The threshold capacity is 1,320 gallons; i.e., 1,321 gallons would trigger the regulation requirement at your facility.

For instance, a farmer calculates he has the capacity to store 2,110 gallons of oil on his farm: two 55 gallon drums of oil in the shop, a 500-gallon diesel tank, a 500-gallon gasoline tank, and an empty 1,000-gallon tank for storing off-road diesel during the planting and harvest seasons. The total capacity of 2,110 gallons exceeds the 1,320-gallon threshold, so the farmer must comply with the federal SPCC requirements.

The following are required by the SPCC regulation:

A farm starting operation on or before August 16, 2002, must maintain its existing SPCC Plan based on the SPCC requirements prior to the new 2002 amendments.

A farm starting operation after August 16, 2002, must prepare and implement an SPCC Plan when EPA promulgates a rule specific to farms and specifies a compliance date for farms.

- A written SPCC Plan. 1) If you store 10,000 gallons or less at your facility and have not had a discharge (see Spill Reporting in the next section) into or upon waters of the U.S. in the last three years, you may write your SPCC plan and certify it. Or, 2) A licensed professional engineer (PE) may write your SPCC plan, after visiting and examining your facility, and certify that the written plan satisfies the requirements. The plan is kept on site; it is not submitted to EPA unless specifically requested.

  If a farm has oil-filled operational equipment (e.g., hydraulic and/or lubricating systems associated with a cotton gin, or transformers) and has not had a discharge (see Spill Reporting in the next section) into or upon waters of the U.S. in the last three years, it may institute an inspection and monitoring program (along with some other requirements), in lieu of secondary containment for oil-filled operational equipment.

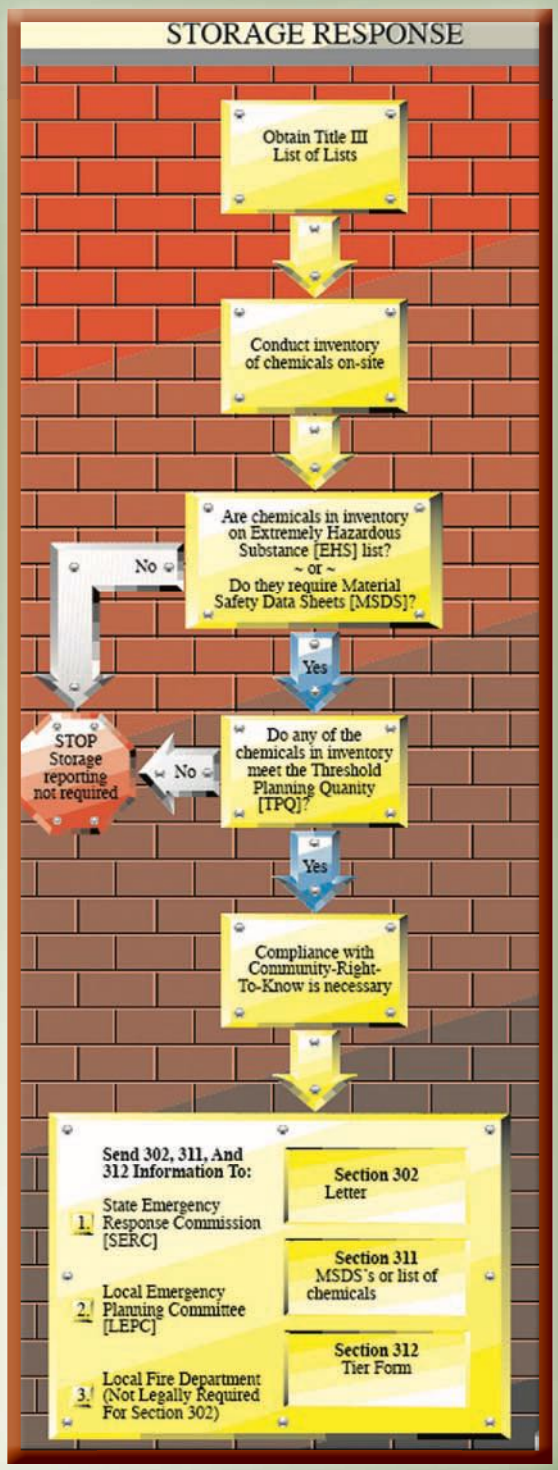
- Sample plans are available through EPA Region 5 Oil Planning and Response Section. Phone: (312) 886-7187 or (312) 353-8200. Web site: http://www.epa.gov/oilspill.

- Oil tanks and products must be contained. The regulation does not specify the type of containment or diversionary structure required. Good engineering practices and a risk analysis (to determine the path a spill would take) should be used to determine the best type of equipment or structure for containment at your facility.
- You must train employees who work in the oil-handling area on preventing, controlling, and responding to an oil spill at your facility. The training must include a discussion and review of the SPCC plan, the procedures in place to prevent releases, applicable pollution control laws and regulations, equipment operation and maintenance, procedures to safely load and unload oil products, and actions to be taken during an emergency. Spill prevention briefings are required at least once a year to promote adequate understanding of the SPCC regulation, re-emphasize the plan requirements, and address any

discharges or failures that have occurred at the facility. For example, if a spill has occurred, the discussion should address the cause and containment of the spill, any equipment malfunction related to the spill, and new measures in place to prevent a recurrence.

The SPCC regulation is found in 40 CFR Part 112, accessible at http://www.epa.gov/oilspill/. Click on "Laws & Regulations." The information is found under "Regulations Implementing EPA's Emergency Response Program." Click on "Oil Pollution Prevention" for an overview, or click on "40 CFR 112" for the entire regulation.

Two publications from Purdue Pesticide Programs may be helpful in organizing and developing a plan specific to your operations. Pesticides and Planning for Emergencies (PPP-44) contains a model emergency plan. The Quick Response Emergency Plan (PPP-45) is a handy guide that can put facts and figures at your fingertips during an emergency.



Reporting On-Site Petroleum Storage to Local and State Agencies

The Federal Emergency Planning and Community Right-to-Know Act (EPCRA) requires businesses and farmers who store hazardous chemicals (e.g., gasoline) above threshold levels to report to government agencies on an annual basis. The main objective of this regulation is to allow local authorities to preplan for fires, spills, accidents, vandalism, natural disasters, and acts of terrorism.

Farmers and business owners must report on-site storage of gasoline, fuel oil, or diesel totaling 10,000 pounds or more. Any substance, to the extent it is used in routine agricultural operations, or any fertilizer held for sale by a retailer for ultimate delivery to the customer, is exempt from this reporting requirement. However, farmers lose the exemption if they operate another business from the farm (e.g., trucking or commercial pesticide application). The Tier II forms must be submitted annually by March 1, reporting the amount of fuel stored for the previous year.

A gallon of diesel fuel or gasoline weighs about 7.5 pounds. Divide the 10,000-pound threshold by 7.5 pounds (one gallon) to determine that 10,000 pounds equals 1333 gallons. This is the quantity of fuel that requires EPCRA reporting. If you have a commercial business, you must report storage above the threshold quantity, using the Tier II Inventory Form (http://yosemite.epa.gov/oswer/ceppoweb.nsf/content/tier2.htm#t2forms). Submit the completed Tier II form to the Indiana Emergency Response Commission (http://www.in.gov/dhs/ierc/), the county's Local Emergency Planning Committee (http://www.epa.gov/ceppo/lepclist.htm), and the fire department(s) responsible for protecting your facility. Information on other state emergency response commissions can be found at http://www.epa.gov/ceppo/serclist.htm.

The list of all hazardous substances covered under this regulation is found in the Title III List of Lists at http://www.epa.gov/ceppo/pubs/title3.pdf. The list also is available through your Local Emergency Planning Committee, the State Emergency Response Commission, and the EPA hot line (800-535-0202). Purdue Pesticide Programs' publication *Pesticides and Community Right-to-Know* (PPP-32) provides a full description of this regulation.

Even if your storage capabilities fall below the reporting threshold, it is a good idea to establish an emergency plan. Work with your fire department,

providing a map of your property and all pertinent information. Refer to these Purdue Pesticide Programs publications to guide you through the process: *Managing Farm Emergencies* (PPP-57) and *Rural Security Planning* (PPP-64).

The EPCRA regulation is found in 40 CFR Part 370. The Web site is http://yosemite.epa.gov/oswer/ceppoweb.nsf/content/index.html. Click on "Laws & Regulations."

Spill Reporting

Knowing whom to call during an oil or chemical spill is essential, but determining whom to call can be confusing. You may need to notify multiple local, state, and federal agencies. Who is called, how soon, and under what circumstances depend on whether the petroleum spill is on-site or in transport. A tri-fold publication, *Pesticides and Spill Management* (PPP-28) from Purdue Pesticide Programs is a quick reference guide to information you will need if you have a spill. *Pesticides and Fleet Vehicles* (PPP-58) addresses spills from a vehicle.

Whenever an oil discharge reaches surface waters of the U.S. or adjoining shorelines, you must notify the National Response Center (800-424-8802) and potentially the U.S. EPA. If the amount discharged in a single release exceeds 1,000 gallons or if there are two releases exceeding 42 gallons (each) within a 12-month period, you must send a written report to the U.S. EPA regional office in Chicago, Illinois, within 60 days of either release. Contact information for EPA's regional offices and the states assigned to each office is available at http://www.epa.gov/epahome/locate2.htm. A copy of the report also must be sent to the Indiana Department of Environmental Management Emergency Response Section. The written information must include the following:

- Your name
- The name of the facility
- The location of the facility
- The maximum oil storage capacity of the facility
- Corrective action and countermeasures taken, including equipment repair and replacement
- A facility description, including site maps, flow diagrams, and topographical maps pertinent to the spill
- The cause of the discharge, including a failure analysis of the fuel storage system
- Preventive measures incorporated or currently under consideration

The full text of the SPCC spill regulation is found in 40 CFR Part 112, accessible at http://www.epa.gov/oilspill/. Click on "Laws & Regulations." The information is found under "Regulations Implementing EPA's Emergency Response Program." Click on "Oil Pollution Prevention" for an overview, or click on "40 CFR Part 112" for the entire text.

Indiana Spill Response Regulations

The Indiana Department of Environmental Management (IDEM) manages Indiana spill response regulations. The regulations place two absolute conditions on the spill of any hazardous material: (1) all spills must be cleaned up; (2) spills that damage water, resulting in injury to humans or animals, must be reported.

Petroleum spills on soil within the facility boundary must be reported when the amount exceeds 1,000 gallons. Other spills, no matter the quantity, must be reported if a response has not been initiated within two hours.

Reportable spills that occur within Indiana must be reported within two hours by calling (888) 233-7745 or (317) 233-7745 (SPIL). Containing a spill takes precedence over reporting to IDEM when the emergency prevents the responsible party from making the phone call. Reporting a spill after the two-hour time limit requires an explanation for the delay.

Determining whether you are obligated to report certain other spills that do not involve injury to humans or animals requires reading the fine print. Reporting requirements are linked directly to the location of the spill. Examples of spill locations described in the rule include public water supply wellhead protection areas, surface waters, soil beyond the facility boundary, and soil within the boundaries of the facility.

In addition to reporting a spill that has damaged or threatens to damage waters of the state, reporting is required if the spill is within the facility boundary or within 50 feet of a private drinking water well located outside the facility. Petroleum product releases over 55 gallons on soil, and spills of any quantity that causes a sheen on water, must be reported when the spill is located outside a facility boundary.

Finally, you may be required to submit a written report if requested by the IDEM emergency responder. Always reference the Incident Number, provided to you when you report the spill, when writing to IDEM. A list of the facts required in the report is found at http://www.in.gov/idem/land/er/spillrptinfo.pdf and includes the following items:

- Product name and description
- Date and time of spill
- Cause of spill
- Spill location (include site specific map with address and zip code)
- Description of area affected (square feet or cubic feet)
- Amount spilled
- Amount recovered
- Containment and cleanup activities (with dates)
- Disposal of recovered material
- Individuals present at the scene (names, positions, organizations)
- Presence or absence of a contingency plan, and whether it was implemented
- List of preventive measures implemented
- Respondent's signature and position with company
- Incident number (include in all correspondence)

Go to http://www.in.gov/idem/land/er/ for the full text of the spill regulation, 327 IAC 2-6.1. Under "Laws and Regulations," click on "Indiana Spill Rule" for the complete text.

Emergency Planning and Community Right-to-Know Act

The regulation that covers the storage of hazardous chemicals also includes spill reporting requirements, which are based on Reportable Quantity (RQ). The RQ sets the amount of an active ingredient that is reportable in the event of a release. There are no RQs for petroleum products, and they are excluded from EPCRA spill reporting. EPCRA does require you to call 911 when gasoline or diesel fuel is spilled during transportation, and the call must be made immediately.

United States Department of Transportation (DOT)

If you are registered with DOT, you have to keep records at your primary place of business for three years following an accident involving a commercial motor vehicle. Your records must include the date of the accident; the city, town, and state where the accident occurred; the driver's name; the number of injuries; the number of fatalities; a statement on any hazardous materials released (except from the tanks of vehicles involved in the accident), and copies of all accident reports filed with the state or the insurers.

As a carrier of hazardous materials (e.g., diesel fuel, gasoline) you are required to notify the National Response Center, (800) 424-8802, immediately after any incident that involves death, injury requiring emergency hospitalization, damage exceeding $50,000 to the vehicle or property, towing of a vehicle, evacuation of the general public for one or more hours, or closure of a major road for an hour or more. You must submit a written report to DOT within 30 days, using Form E5800.1. Address the report to Information Systems Manager, DHM-63, Research & Special Programs Administration, Department of Transportation, Washington, DC 20590-0001.

Additional information on DOT regulations is available in *DOT Rules of the Road* (PPP-65) and *Carrying Farm Products and Supplies on Public Roads* (PPP-68), published by Purdue Pesticide Programs.

Indiana Fire Code (IFC)

Indiana's Fire Code was updated and amended in 2003. However, it is the fire code in effect at the time of your aboveground storage tank installation that applies. When installing a new AST or upgrading an existing one, the most current revision applies. The latest code is commonly available for review at the fire chief's base of operation. It is important to read the code when preparing to upgrade your petroleum storage unit. The information that follows is from the 2003 fire code.

Protection Against Vehicular Damage to Tanks

It is important to protect your aboveground storage tanks from damage by vehicles. Pipes, valves, and fittings can be protected with steel guard posts placed at least three feet from the tanks being protected. Each post must be at least four inches in diameter, and the space between posts must measure no more than four feet. Each post must

be placed in a hole at least 3 feet deep with a 15-inch concrete footing; the hole must filled with concrete to hold the post in place. A three-foot section of each post must be visible aboveground.

Fire Protection Equipment

Portable fire extinguishers are required when fuel is stored. Fire protection for the storage, use, dispensing, mixing, handling, and on-site transportation of flammable and combustible liquids is required by IFC 906.2 and IFC 3403.2.1.

Informational Signs

Identifying tank contents is of primary importance to the management of fuels:

- Signs prohibiting open flames and smoking must be posted.
- A permanently installed or mounted tank that holds a minimum of 100 gallons of a Class I, II, or IIIA liquid product shall bear a placard

that identifies the product. This does not apply to tanks of 300-gallon capacity (or less) located on private property and used for heating and cooking fuels in single-dwelling homes.

General Maintenance

Grass, weeds, and combustible materials shall not be allowed to accumulate around petroleum tanks.

Vents

Vents are an important element in the safe storage of fuel.

- Vent outlets must be at least five feet from building openings and property lines.
- Vents must be located so that vapors are released at a safe point at a height not less than 12 feet above adjacent ground level. Vent outlets shall be located such that flammable vapors are not trapped by eaves or other obstructions.
- Vents for flammable liquids should be three feet above the roof line or 12 feet above grade.

Containment and Filling

All outdoor storage tanks must have secondary containment large enough to accommodate a total spill from the largest tank plus a 24-hour rainfall event. Each tank may be filled to only 95 percent capacity.

Indoor Storage Cabinets

The focus typically is on the outdoor storage of fuel, but indoor storage also is addressed by the Indiana Fire Code.

- Signs that read "Flammable—Keep Fire Away" must be posted on storage cabinets.
- The amount of liquid stored in a fireproof cabinet cannot exceed 120 gallons; no more than 60 gallons of it may be a Class I or II liquid.
- Up to three storage cabinets that hold flammable liquids may be placed in a single fire protection area.

United States Occupational Safety and Health Administration

The Occupational Safety and Health Administration (OSHA) regulates all businesses as well as farms with more than ten employees. OSHA has many regulations in the Code of Federal Regulations dealing with tank construction specifications. Title 29 CFR Part 1910.106 addresses petroleum and fuel products:

- Tanks designed for underground fuel storage may be used aboveground if they hold less than 2,500 gallons. However, reuse of underground tanks for aboveground fuel storage is not recommended.
- A minimum of three feet must separate any two storage tanks holding flammable or combustible liquids.
- A minimum of 20 feet must separate a liquefied petroleum gas container from a tank holding a flammable or combustible material.
- Vent pipe outlets for tanks holding Class I liquids shall be distanced from buildings so that vapors will not pose a human health threat, shall be at least 12 feet above the ground, shall be positioned to prevent vapors from accumulating under eaves or other obstructions, and shall be at least 5 feet from building openings.
- Vent pipes shall be at least as large as the largest fill or withdrawal pipe, but no smaller than ¼ inch in diameter.
- Tank supports shall be placed on firm foundations constructed of concrete, masonry, or steel. Single wood timber supports (not cribbing) laid horizontally may be used for outside aboveground tanks if not more than 12 inches high at their lowest point.
- Tanks can rest on the ground or on foundations made of concrete, masonry, piling, or steel. Tank foundations shall be level and must be positioned to minimize tank corrosion.
- Portable fire extinguishers and other fire control equipment must be provided at points of operation and wherever flammable or combustible liquids are stored. Personnel expected to use this equipment must be trained in its use and operation.

Indiana Used Oil Policies

Indiana used oil regulations (329 IAC 13-1-1) are accessible at http://www.in.gov/idem/rules/agency.html#waste. Click on the heading "Article 13 Used Oil Management." The regulations specify the following regarding used oil storage tanks:

- They must be in good condition with no severe rusting or apparent structural defects.
- They must not be leaking.
- They must be marked with the words "Used Oil."
  Indiana has a policy titled "Used Oil Filters" that explains how used filters must be handled; go to http://www.in.gov/idem/rules/policies/ under the heading "Waste 0023." A filters that has been properly drained can be either recycled or disposed in a solid waste landfill when one of the following specific conditions is met:
- Filters must be hot drained and crushed. "Hot drain" is the term used to describe turning the filter over immediately after removal and allowing the hot oil to drain from it.
- The anti-drain back valve or filter dome end of the filter must be punctured and hot drained for 12 hours.
- The filter must be dismantled and hot drained for 12 hours.

This tank would not pass a regulatory inspection.

Conclusion

On-site storage of petroleum products benefits farmers and business owners. It provides easy, 24-hour access and price breaks; and storing diesel for off-road agricultural use yields a tax break.

But the benefits are clearly offset by significant risks posed by storing fuel and other petroleum products. Choosing the placement of fuel tanks based on convenience for employees can lead to neglect. That is, if they are not in an area that you view regularly, spills and other accidents are more likely to go unnoticed. Don't let neglect trump wise management on your farm or at your place of business.

You can implement simple procedures and best management practices that will significantly reduce the risks of on-site storage. A single fuel tank on your property carries enough risk to warrant your attention to the safety procedures and protection measures addressed in this publication. The benefits of storing petroleum products on-site hinge on your good management of the process.

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PUBLICATIONS

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Appendix I

550-Gallon Tank Chart ~ 48" Diameter X 6' Length

Inches	Gallons	Inches	Gallons	Inches	Gallons	Inches	Gallons	Inches	Gallons	Inches	Gallons	Inches	Gallons	Inches	Gallons
	0	6	40	12	108	18	188	24	275	30	362	36	442	42	510
1/8	0	6 1/8	41	12 1/8	110	18 1/8	190	24 1/8	277	30 1/8	364	36 1/8	444	42 1/8	511
1/4	1	6 1/4	43	12 1/4	111	18 1/4	192	24 1/4	279	30 1/4	366	36 1/4	445	42 1/4	513
3/8	1	6 3/8	44	12 3/8	113	18 3/8	193	24 3/8	281	30 3/8	367	36 3/8	447	42 3/8	514
1/2	2	6 1/2	45	12 1/2	115	18 1/2	195	24 1/2	283	30 1/2	369	36 1/2	449	42 1/2	515
5/8	2	6 5/8	46	12 5/8	116	18 5/8	197	24 5/8	284	30 5/8	371	36 5/8	450	42 5/8	516
3/4	2	6 3/4	48	12 3/4	118	18 3/4	199	24 3/4	286	30 3/4	373	36 3/4	452	42 3/4	518
7/8	3	6 7/8	49	12 7/8	119	18 7/8	200	24 7/8	288	30 7/8	374	36 7/8	453	42 7/8	519
1	3	7	50	13	121	19	202	25	290	31	376	37	455	43	520
1 1/8	4	7 1/8	51	13 1/8	123	19 1/8	204	25 1/8	292	31 1/8	378	37 1/8	457	43 1/8	521
1 1/4	4	7 1/4	53	13 1/4	124	19 1/4	206	25 1/4	294	31 1/4	380	37 1/4	458	43 1/4	522
1 3/8	5	7 3/8	54	13 3/8	126	19 3/8	208	25 3/8	295	31 3/8	381	37 3/8	460	43 3/8	523
1 1/2	6	7 1/2	55	13 1/2	127	19 1/2	210	25 1/2	297	31 1/2	383	37 1/2	461	43 1/2	524
1 5/8	6	7 5/8	56	13 5/8	129	19 5/8	211	25 5/8	299	31 5/8	385	37 5/8	463	43 5/8	525
1 3/4	7	7 3/4	58	13 3/4	130	19 3/4	213	25 3/4	301	31 3/4	387	37 3/4	464	43 3/4	526
1 7/8	7	7 7/8	59	13 7/8	132	19 7/8	215	25 7/8	302	31 7/8	388	37 7/8	466	43 7/8	527
2	8	8	60	14	133	20	217	26	304	32	390	38	467	44	528
2 1/8	9	8 1/8	61	14 1/8	135	20 1/8	219	26 1/8	306	32 1/8	392	38 1/8	469	44 1/8	529
2 1/4	10	8 1/4	63	14 1/4	137	20 1/4	221	26 1/4	308	32 1/4	393	38 1/4	470	44 1/4	530
2 3/8	10	8 3/8	64	14 3/8	138	20 3/8	222	26 3/8	310	32 3/8	395	38 3/8	472	44 3/8	531
2 1/2	11	8 1/2	66	14 1/2	140	20 1/2	224	26 1/2	312	32 1/2	397	38 1/2	473	44 1/2	532
2 5/8	12	8 5/8	67	14 5/8	142	20 5/8	226	26 5/8	313	32 5/8	398	38 5/8	475	44 5/8	533
2 3/4	13	8 3/4	68	14 3/4	144	20 3/4	228	26 3/4	315	32 3/4	400	38 3/4	476	44 3/4	534
2 7/8	13	8 7/8	70	14 7/8	145	20 7/8	229	26 7/8	317	32 7/8	401	38 7/8	478	44 7/8	535
3	14	9	71	15	147	21	231	27	319	33	403	39	479	45	536
3 1/8	15	9 1/8	73	15 1/8	149	21 1/8	233	27 1/8	321	33 1/8	405	39 1/8	480	45 1/8	537
3 1/4	16	9 1/4	74	15 1/4	150	21 1/4	235	27 1/4	323	33 1/4	407	39 1/4	482	45 1/4	538
3 3/8	17	9 3/8	76	15 3/8	152	21 3/8	237	27 3/8	324	33 3/8	408	39 3/8	483	45 3/8	538
3 1/2	18	9 1/2	77	15 1/2	154	21 1/2	239	27 1/2	326	33 1/2	410	39 1/2	485	45 1/2	539
3 5/8	19	9 5/8	79	15 5/8	155	21 5/8	240	27 5/8	328	33 5/8	412	39 5/8	486	45 5/8	540
3 3/4	20	9 3/4	80	15 3/4	157	21 3/4	242	27 3/4	330	33 3/4	414	39 3/4	487	45 3/4	541
3 7/8	21	9 7/8	82	15 7/8	158	21 7/8	244	27 7/8	331	33 7/8	415	39 7/8	489	45 7/8	541
4	22	10	83	16	160	22	246	28	333	34	417	40	490	46	542
4 1/8	23	10 1/8	85	16 1/8	162	22 1/8	248	28 1/8	335	34 1/8	419	40 1/8	491	46 1/8	543
4 1/4	24	10 1/4	86	16 1/4	164	22 1/4	250	28 1/4	337	34 1/4	420	40 1/4	493	46 1/4	543
4 3/8	25	10 3/8	88	16 3/8	165	22 3/8	251	28 3/8	339	34 3/8	422	40 3/8	494	46 3/8	544
4 1/2	26	10 1/2	89	16 1/2	167	22 1/2	253	28 1/2	341	34 1/2	423	40 1/2	495	46 1/2	545
4 5/8	27	10 5/8	91	16 5/8	169	22 5/8	255	28 5/8	342	34 5/8	425	40 5/8	496	46 5/8	545
4 3/4	28	10 3/4	92	16 3/4	171	22 3/4	257	28 3/4	344	34 3/4	426	40 3/4	498	46 3/4	546
4 7/8	29	10 7/8	94	16 7/8	172	22 7/8	258	28 7/8	346	34 7/8	428	40 7/8	499	46 7/8	546
5	30	11	95	17	174	23	260	29	348	35	429	41	500	47	547
5 1/8	31	11 1/8	97	17 1/8	176	23 1/8	262	29 1/8	350	35 1/8	431	41 1/8	501	47 1/8	547
5 1/4	33	11 1/4	98	17 1/4	178	23 1/4	264	29 1/4	352	35 1/4	432	41 1/4	503	47 1/4	548
5 3/8	34	11 3/8	100	17 3/8	179	23 3/8	266	29 3/8	353	35 3/8	434	41 3/8	504	47 3/8	548
5 1/2	35	11 1/2	102	17 1/2	181	23 1/2	268	29 1/2	355	35 1/2	436	41 1/2	505	47 1/2	549
5 5/8	36	11 5/8	103	17 5/8	183	23 5/8	269	29 5/8	357	35 5/8	437	41 5/8	506	47 5/8	549
5 3/4	38	11 3/4	105	17 3/4	185	23 3/4	271	29 3/4	359	35 3/4	439	41 3/4	508	47 3/4	549
5 7/8	39	11 7/8	106	17 7/8	186	23 7/8	273	29 7/8	360	35 7/8	440	41 7/8	509	47 7/8	550
														48	550

Appendix II

Monthly Checklist for Aboveground Storage Tanks

Date_____ **Completed by**_____

Location_____

Is there any deterioration of the tank, tank coating, pipes, valves, foundation, drainage mechanism, or safety equipment? If yes, specify below or on the back of this document.	Yes	No	
Does the hose show evidence of deterioration?	Yes	No	
Is the fire extinguisher fully operational?	Yes	No	
Is there any water at the lowest possible point inside the primary tank? *State below if water was discovered and removed.*	Yes	No	
Is there any evidence of liquid (fuel or water) in the interstitial space of double-walled tank?	Yes	No	N/A
Are all drain valves secured in the closed position?	Yes	No	N/A
Is there any accumulation of water or fuel in the containment area? *State details of remedial action (absorption and disposal of fuel, or removal of water) below or on a separate sheet of paper.*	Yes	No	N/A
Is the spill basket clean and functional?	Yes	No	N/A
Are there any obstructions or restrictions that prevent normal function of the normal and emergency vents? *If yes, specify below or on a separate sheet of paper.* *Ensure that the emergency vent moves freely.*	Yes	No	N/A
Are there any operational malfunctions of auxiliary equipment?	Yes	No	N/A
Is there any evidence of a fuel release?	Yes	No	
Is a complete spill kit easily accessible?	Yes	No	
Are there any conditions that may pose fire, safety, or environmental hazards? *If yes, specify below or on a separate sheet of paper.*	Yes	No	

Comments_____

Correct any deficiencies immediately. Keep checklist on file.

[Continue comments on separate sheet of paper if necessary.]

Appendix III

Weekly Inspection Checklist for Containment Water Release

Location:_____

Date	Is there any accumulation of water in the storage area containment?		Does the containment water have a sheen?			Has any oily sheen been absorbed from the surface of the containment water?			Has containment water been released?		
	Yes	No	Yes	No	N/A	Yes	No	N/A	Yes	No	N/A

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