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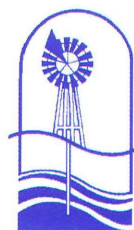
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On –Farm Fuel Storage
Michigan State University Extension Service
Roberta Dow, Michigan Groundwater Stewardship Program
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On-Farm Fuel Storage



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On-Farm Fuel Storage

Leaks or spills from fuel storage have resulted in many contamination sites around the state. As fuel moves down through the soil, it leaves residues coating the mineral and organic particles. Viscous fuels move slowly down through the soil; gasoline moves more quickly. Fuel is lighter than water and does not mix easily with it. The fuel tends to remain above the water table. Some components of oil and gasoline, however, are water-soluble, so they will dissolve into the groundwater and be carried with it as it moves. If the groundwater discharges to surface water, the contamination will be discharged to the surface, too.

Fuel residues in the soil may be moved downward through the soil profile by rain and melting snow. Contamination of groundwater can continue for many years from a leak or spill. In addition, if the level of the water table drops, the fuel layer will also drop, leaving a thin coating on particles below the previous level of the water table.

Some species of bacteria can break down this fuel residue, but low oxygen levels in the soil limit this from readily occurring. The total effect of a fuel leak or spill can be a very long-lasting, complex problem.

Fuel leaked into the ground has severe consequences for public safety and health. In enclosed spaces, such as basements and sewer lines, petroleum vapors from a leak can create hazards ranging from unhealthful odors to disastrous

explosions. In addition, contaminated soil and water can harm crops, wildlife and humans. Oil and gasoline can be toxic if ingested or if absorbed through the skin, even in extremely low concentrations. Some components of gasoline, such as benzene and ethylene dibromide (EDB) from leaded gas, are known carcinogens.

Fuel storage is one of the highest groundwater contamination risks for farmers; however, good management can greatly decrease future liability. **This bulletin is about fuel storage for on-farm motor vehicle fueling.** Other types of fuel storage are covered by different rules and are not covered here.

This bulletin focuses on managing aboveground small (1,100 gallons or less) fuel tank storage, but it also addresses underground tanks and large tanks (greater than 1,100 gallons). Most farmers choose aboveground small tanks because they provide lower contamination risks and do not require a Michigan Department of Environmental Quality (MDEQ) site plan, certification/registration or an annual fee.

Users of this bulletin need only refer to the section(s) dealing with the tank size and location (aboveground or underground) that you have or plan to have. Complete the checklists for these sections to determine what rules apply to your situation and if you are in compliance.

A leaking underground storage tank can be expensive and difficult to clean up. I know! I own a farm that had an old working underground gasoline storage tank. In 1995, I decided to remove the working tank before it corroded and a leak occurred. During removal, an older, unused underground tank was found nearby. Upon removal of this tank, a small, pinprick hole was found in the tank. This unused tank was probably abandoned years ago because it had leaked. From the small opening, gasoline had contaminated the subsoil and groundwater. Initially it was thought that maybe only the subsoil was contaminated, so subsoil down to 11 feet was removed, but the contamination became greater rather than less as we dug deeper. The petroleum odor became stronger. Soil and water sampling (following installation of monitoring wells) determined the amount and extent of the groundwater contamination. Fortunately, it was a very small plume. Remediation and monitoring have been ongoing since 1995. In 2004, a vacuum extraction system for petroleum volatiles was installed. Possibly the site will reach "clean closure" in the next year.

My situation points out that proactive prevention lowers liability, is less aggravation, is much cheaper than remediation, and protects our family's health and our drinking water.

– Roberta L. Dow

Acknowledgements

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Roberta L. Dow, Ph.D.
MSUE, MGSP

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Section I. Aboveground small tanks (1,100 gallons or less)

Siting a new aboveground tank or tanks

Determining if you are in compliance – Locating a site for a fuel tank that complies with the separation distances required by the MDEQ is often difficult. The best starting point is the drinking water well. Make a map of your farmstead (use blank graph sheet in **Fig.1**). Draw a circle with a 50- or 800-foot radius around the drinking water well. If your farm is not a dairy farm and you have no employees, use a 50-foot radius – the well is classified as a single-family, private drinking water well. If you have a dairy farm and/or one or more employees (or plan to have employees), then the well is (or will be) classified as a Type III or Type IIb public well, and you need the 800-foot separation distance between your well and the fuel tank. You may be able to decrease the required 800-foot separation distance if you meet certain protective criteria related to your well depth, groundwater flow direction, site geology and pump capacity (**Table 1**).

Draw the radius of the circle on your map as determined by your conditions. Then begin choosing a place on or outside of this circle that meets the other separation distances listed below in **Table 2**. Once you have chosen possible tank sites, you will need to measure carefully to ensure that you meet or exceed the separation distances.

After siting your tank(s), read Table 3 to learn the rules you need to meet for compliance. **Fig. 2** may help you with the many separation distances required for small aboveground tanks.

On-farm fuel storage for farm motor vehicle fueling

If you installed your tank(s) in compliance with the MDEQ's 1992 *Storage and Handling of Flammable and Combustible Liquids* (FL/CL) rules and you aren't making any changes,

then you are grandfathered-in under the 2003 FL/CL rules. If you make changes to your tank or equipment, you will need to upgrade to meet the updated FL/CL rules of 2003. Tables 2 and 3 cover information from the rules with the rule year listed to help you determine if your tank(s) and equipment are in compliance.

Where to find the rules for fuel storage

Several sets of rules cover fuel storage:

- The Michigan Department of Environmental Quality's (MDEQ) *Storage and Handling of Flammable and Combustible Liquids* (August 13, 2003) (FL/CL).
- The National Fire Protection Association's *NFPA 30A Code for Motor Fuel Dispensing Facilities and Repair Garages* and the *NFPA 30 Flammable and Combustible Liquids Code* are adopted by reference in the FL/CL.
- Michigan's *Safe Drinking Water Act, Act 399, P.A. 1976, and Administrative Rules*.
- The Federal *Clean Water Act, 40 CFR, Part 112, Oil Pollution Prevention and Response; Non-Transportation-Related Onshore and Offshore Facilities*.
- Underground fuel storage is covered by the FL/CL rules and for tanks larger than 1,100-gallons, also by the *Michigan Underground Storage Tank Rules*.

You can get the Michigan rules at the MDEQ Web site (www.michigan.gov/deq). For information on the federal Clean Water Act and the Spill Prevention Control and Countermeasure plan rules, go to www.epa.gov/oilspill/spccrule.htm. If you want to read the NFPA codes, contact your local fire department.

Table 1. Criteria for reducing the 800-foot minimum well isolation distance for fuel tanks without secondary containment¹ from existing Type IIb or Type III public water supplies with a maximum withdrawal capacity of 100,000 gallons per day.

<p>Reduction allowed down to 400 feet where the following protection factors are documented:</p> <p>A or, B+D or, C+D</p>	<p>Reduction allowed down to 200 feet where the following protection factors are documented:</p> <p>A+B or, A+C or, A+D or, B+C or, E</p>
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Protection factors:

A – The groundwater flow direction from the aboveground fuel tank is away from the well.

B – Confining material of 10 feet of continuous clay or 20 feet of a continuous clay mixture is present under tank/well site.

C – Well casing depth is 100 feet or more.

D – Well pump capacity is 25 gallons per minute or less.

E – B (minimum of 10 feet of continuous clay or 20 feet continuous clay mixture) + C (minimum of 60 feet casing depth) = 100 feet or more.

¹Fuel tanks with secondary containment may be located no closer than 75 feet to a Type IIb or Type III public water supply with maximum withdrawal capacity of 100,000 gallons per day. The isolation distance between tank and well should be maximized to the extent possible.

Figure 1. Blank graph sheet for drawing farmstead map.

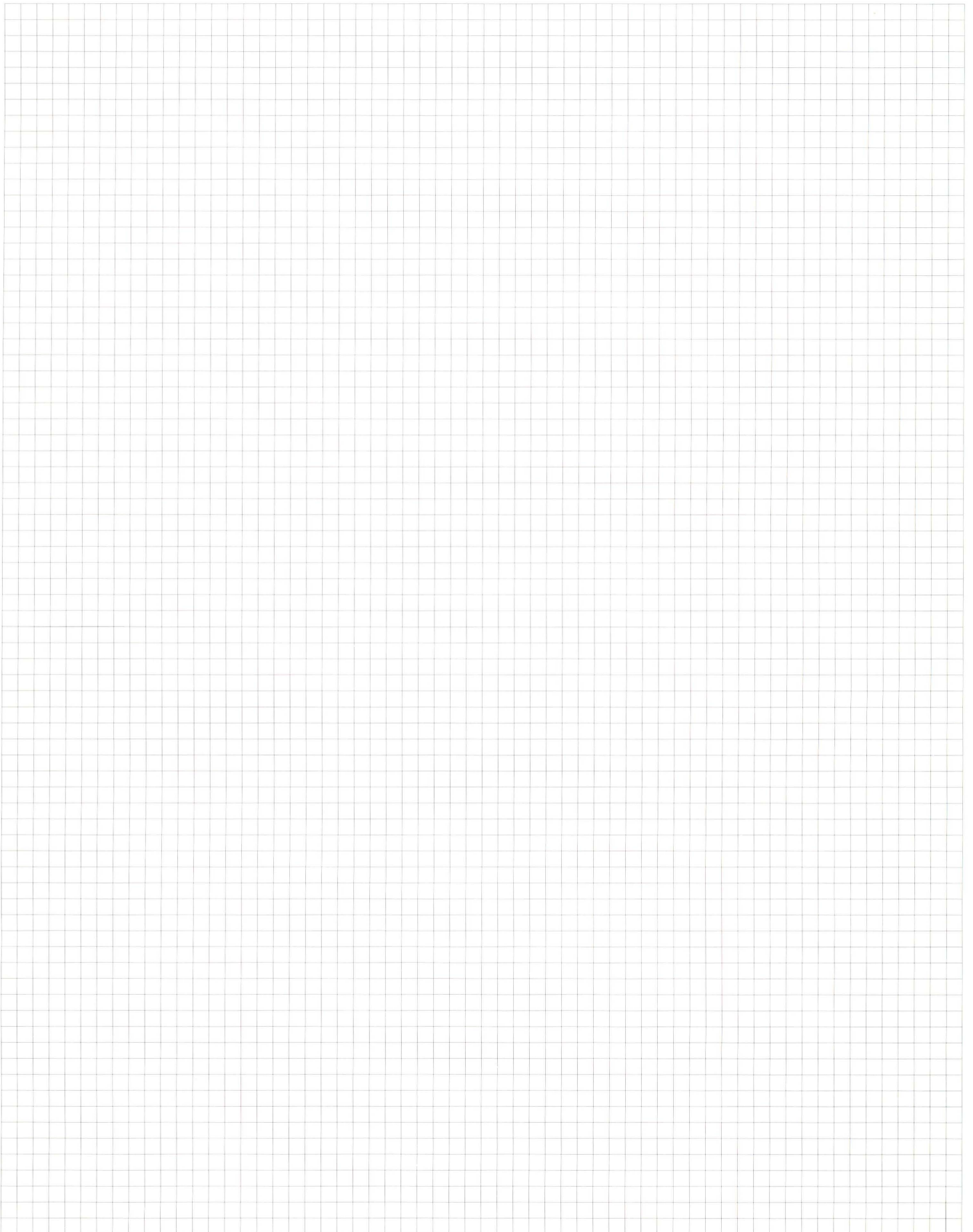


Table 2. Separation distances for aboveground small tanks (1,100 gallons or less).

Single-walled tank with or without secondary containment separated from:	Year of FL/CL or other rules*	Separation distance	Your distance
Single-family drinking water well	2003 & 1992	More than 50 feet (Figs. 2, 3)	
Well on dairy farm or farm with one or more employees, or from public well at neighboring business, school, church, etc.	1976 - Safe Drinking Water Act. PA399 2003 & 1992	800 feet or greater for Type IIb and Type III (see "Criteria," Table 1) 2,000 feet or greater for Type I and Type IIa public wells 75 feet or greater for tank with secondary containment	
Mineshaft, mine air escape, school, church, hospital, theater, nursing home, penal institution, adult foster care facility and home for aged	2003 & 1992	300 feet or greater	
Building used for public assembly of 50 or more people.	2003	More than 100 feet	
Storm drain, surface water or designated wetland unless some other engineering control exists so that a release would be controlled or directed in another direction.	2003	More than 50 feet, 0 feet if secondary containment present	
Building or structure.	2003, 1992 – Included haystacks and other combustible structures	40 feet or greater (Figs. 2, 4)	
Buildings and property lines of adjacent properties that can be built upon.	2003	More than 40 feet (Figs. 2, 4)	
Closer edge of public way.	2003	More than 25 feet (Figs. 2, 4)	
Sources of ignition.	2003, 1992 – "Open flames and smoking shall not be permitted in the storage area." No distance given.	More than 25 feet	
Combustibles (weeds and other combustible materials).	2003, 1992 – "Storage area free of weeds and extraneous combustible materials." Does not specify area size.	10 feet out from tank for area free of combustibles	

Continued on page 7

Table 2. Separation distances for aboveground small tanks (1,100 gallons or less) – cont.

Fire-protected tank (UL 2085) separated from:	Year of FL/CL or other rules*	Minimum separation distance	Your distance
Nearest important building on same property.	2003	5 feet	
Lot line that can be built upon, including opposite side of a public way.	2003	15 feet	
Nearest side of any public way.	2003	5 feet	
Storm drain, surface water or designated wetland.	2003	0	
See separation distances for single-family drinking water well; well on dairy; mineshaft, mine air escape, school, building used for public and combustibles listed under single-walled tank above.	As listed under single-walled tank with or without secondary containment (see above)	As listed under single-walled tank with or without secondary containment (see above)	

* Rules other than FL/CL rules are specified, with date.

Figure 2. Diagram of aboveground small tank separation distances. All measurements should be considered minimum. Drawing not to scale.

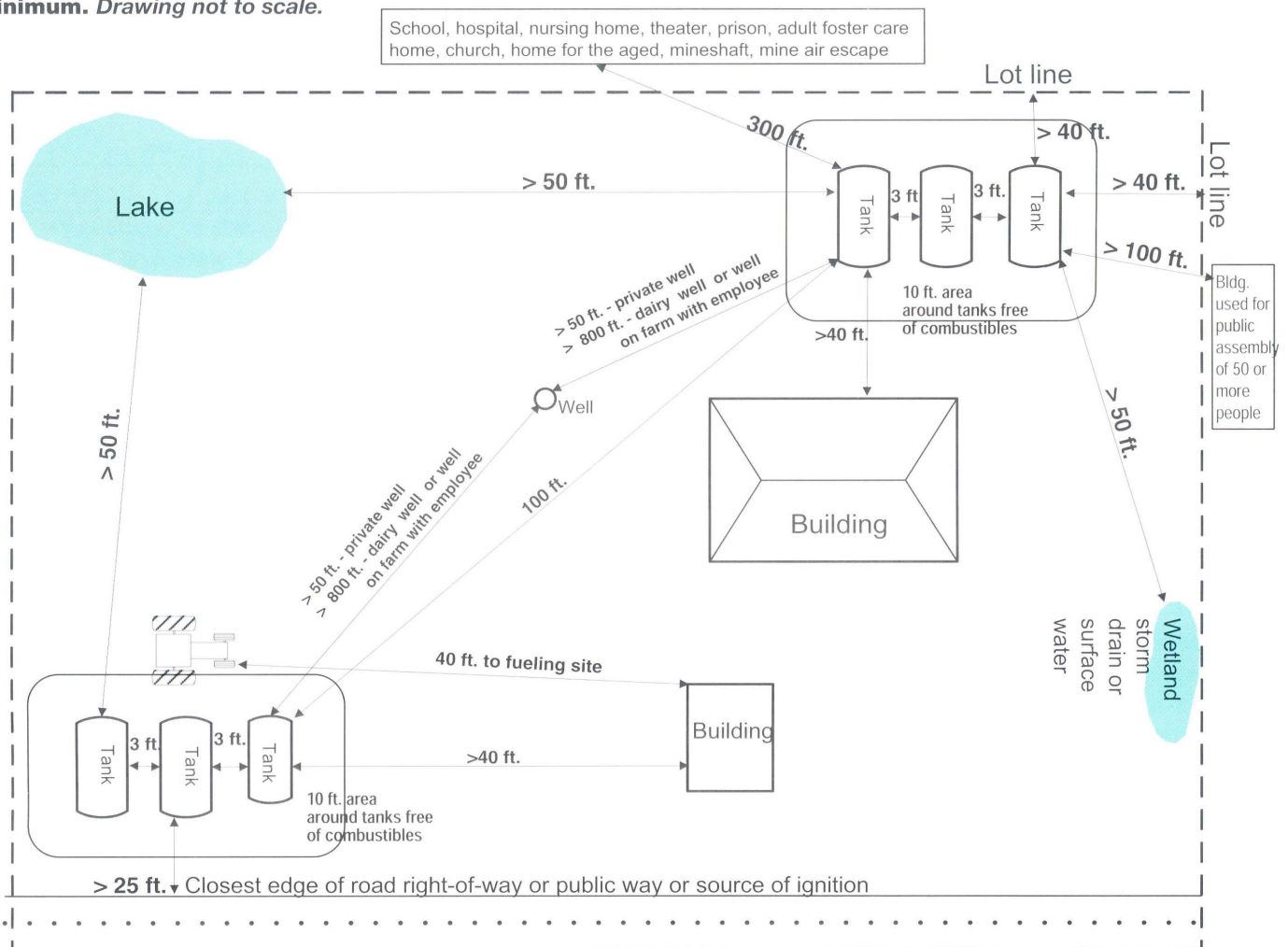


Table 3. Other rules for aboveground small tanks (1,100 gallons or less).

Aboveground tank location	Year of FL/CL or other rules*	Check if meets rule <input checked="" type="checkbox"/>
Tank(s) located outdoors; may be under roof in diked area; see roof or canopy requirements, pg. 11 .	2003	
No more than three tanks (each 1,100 gallons capacity or less) allowed per site (Fig. 2).	2003 & 1992	
Tanks may not be manifolded (hooked together so that one pump operates several tanks). Manifolding makes multiple small tanks behave as one large tank. Should there be a catastrophe, there would be the risk of a large tank without the protections required for a large tank.	2003	
Tanks must be separated by at least 3 feet (Fig. 2).	2003 & 1992	
Multiple sites allowed on a farm. Sites must be separated by 100 feet or more (Fig 2).	2003 & 1992	
Vehicles, equipment or containers being filled from the tank are located 40 feet from any building (Fig 2).	2003 & 1992	
Tank design and construction	Year of FL/CL or other rules*	Check if meets rule <input checked="" type="checkbox"/>
Single-compartment design, whether it is a single- or double-walled tank.	2003 & 1992	
Steel to meet standard UL 142.	2003, 1992 -- Gives specific design and steel thickness for tank capacities.	
Tank designed for the type of fuel stored and the way the fuel is stored.	2003 & 1992	
Lockable closure on fill opening (Fig. 7).	2003 & 1992	
Separate fill and vent opening for each tank (Figs. 7, 12).	2003 & 1992	
Normal and emergency vent for each single-walled tank, each primary tank and the interstitial space of each double-walled tank that complies with UL 142, "Steel Aboveground Tanks for Flammable and Combustible Liquids" (Figs. 4, 5, 12).	2003, 1992 – Emergency vent(s) not required.	
Venting located so as to prevent localized overheating of or direct flame impingement on any part of the tank if vapors from the vent are ignited (Figs. 4, 5, 12).	2003 & 1992	

Continued on page 9

Table 3. Other rules for aboveground small tanks (1,100 gallons or less) – cont.

Top-opening aboveground tanks	Year of FL/CL or other rules*	Check if meets rule <input checked="" type="checkbox"/>
Stably mounted on solid timbers, solid cement blocks or equivalent to protect the tank bottom from corrosion due to contact with ground.	2003 & 1992	
Movable tanks shall be equipped with attached metal legs resting on shoes or runners (Figs. 4, 6, 12).	2003 or 1992	
Tightly and permanently attached approved pumping device and hose (Figs. 9, 10).	2003 & 1992	
Dispensers made inoperable when not in use, to prevent tampering (Fig. 8).	2003, 1992 – “Pump or hose equipped with padlock to the hanger.”	
Pump discharge equipped with an effective anti-siphoning device or discharge hose equipped with self-closing nozzle (Fig. 8).	2003 & 1992	
Aboveground tanks using gravity to release fuel	Year of FL/CL or other rules*	Check if meets rule <input checked="" type="checkbox"/>
No siphons, internal pressure discharge devices or manifolds.	2003, 1992 –Does not list manifolds.	
Stably mounted on steel or wood supports or solid timbers of adequate strength to support tank, or stably sited on elevated area such as soil berm with tank raised 6 inches off the ground for corrosion protection (Fig. 13).	2003 & 1992	
Discharge connection adjacent to tank shall have heat-actuated auto-closing valve that automatically closes if there’s fire near tank.	2003 & 1992	
Manual shut-off valve also present if heat-actuated valve cannot also be operated manually.	2003 & 1992	
Discharge connectors shall be made to bottom or end of tank.	2003 & 1992	
Discharge connection shall have a locking valve so that it can be padlocked to prevent tampering.	2003 & 1992	
Approved hose on discharge connection.	2003 & 1992	
Self-closing nozzle at discharge end.	2003 & 1992	

* Rules other than FL/CL rules are specified, with date.

Continued on page 10

Table 3. Other rules for aboveground small tanks (1,100 gallons or less) – cont.

Containment and spill prevention	Year of FL/CL or other rules*	Check if meets rule <input checked="" type="checkbox"/>
Visual checks and inventory control are used to monitor tank for leaks.	Not required, but recommended	
Impervious surface to prevent spills from entering the groundwater, surface water or subsurface soils at each area where liquids are transferred from the tank to a vehicle, equipment or container. Surface needs to be impervious to type of fuel transferred (Figs. 4, 6, 12, 13, 14).	2003, 1992 – Spill prevention required but not stated as “impervious surface.”	
If a single-walled tank is chosen, then a dike may be used for secondary containment. Secondary containment not required for small tanks if total amount of petroleum stored is less than 1,320 gallons.	2003 & 1992	
Where diking is used for secondary containment for a single-walled tank (not covered under 1992 rules for small tanks), the following need to be met: • Dike must hold 100% of largest tank in the dike plus displacement volume of any other tanks in the diked area located below the dike wall.	2003	
• Dike floors and walls must not leak, must be made of noncombustible construction and must be designed to withstand full hydrostatic head (the pressure of the liquid in the dike if filled).	2003	
• Outside base of dike shall not be closer than 10 feet to any property line that is or can be built upon.	2003	
Where provision is made for draining water from dike areas, the drains shall be attended during operation, only manually activated, locked and closed when not attended, and controlled in a manner that prevents flammable or combustible liquids from entering natural water courses, groundwater, public sewers or public drains. Control of drainage shall be accessible under fire conditions from outside the dike.	2003 & 1992	
Secondary containment is required by Clean Water Act if farm has more than 1,320 gallons (combined total of containers 55 gallons and greater) of petroleum products where, should a release occur, it would likely go into wetland or surface water. Secondary containment also needed if spills would go into groundwater and then into surface water.	Federal Clean Water Act, 40 CFR, Part 112 -- 2002	
Secondary containment to meet the Clean Water Act requires that the dike also contain the volume of a 24-hour rain event. Your licensed professional engineer will suggest what level rain event to use. (continued)	Federal Clean Water Act, 40 CFR, Part 112 – 2002	

Continued on page 11

Table 3. Other rules for aboveground small tanks (1,100 gallons or less) – cont.

Containment and spill prevention, cont.	Year of FL/CL or other rules*	Check if meets rule <input checked="" type="checkbox"/>
<i>(continued)</i> Secondary containment may consist of double-walled tanks, continuous-pour concrete dikes, earthen dikes with a non-permeable liner (various types of plastics or clay) placed at least 6 inches under some form of earthen cover (sand, crushed stone, pea gravel, etc.) or steel pans made by a tank manufacturer.	Federal Clean Water Act, 40 CFR, Part 112 -- 2002	
A spill prevention control and countermeasure (SPCC) plan is required for farms with more than 1,320 gallons (combined total of containers 55 gallons and greater) of petroleum products on farm where, should a release occur, it would likely go into wetland or surface water. Farm also needs a plan if spills would go into groundwater and then into surface water.	Federal Clean Water Act, 40 CFR, Part 112 -- 2002	
The SPCC plan must be reviewed and certified by a licensed professional engineer (PE). The PE or his designate have to examine the facility.	Federal Clean Water Act, 40 CFR, Part 112 -- 2002	
If roof or canopy is desired over the dike	Year of FL/CL or other rules*	Check if meets rule <input checked="" type="checkbox"/>
Roof, canopy and supports must be noncombustible.	2003, 1992 – Roof or canopy not allowed.	
Supports must be outside of dike (they may be on the walls of the dike).	2003, 1992 – Roof or canopy not allowed.	
Must be designed so vapors don't collect under roof or canopy.	2003, 1992 – Roof or canopy not allowed.	
Normal tank vent must extend through roof or canopy.	2003, 1992 – Roof or canopy not allowed.	
Lowest part of roof or canopy must be at least 6 feet above top of tank.	2003, 1992 – Roof or canopy not allowed.	
Tank labeling	Year of FL/CL or other rules*	Check if meets rule <input checked="" type="checkbox"/>
Lettering must be 3 inches or more high and conspicuous (Fig. 12).	2003, 1992 – Just says, "conspicuously marked."	
Tanks must show the name of product contained – for example, GAS or DIESEL (Fig. 12).	2003 & 1992	
Tanks storing gasoline must be labeled FLAMMABLE – KEEP FIRE AND FLAME AWAY.	2003 & 1992	

* Rules other than FL/CL rules are specified, with date.

Table 3. Other rules for aboveground small tanks (1,100 gallons or less) – cont.

Tank labeling, cont.	Year of FL/CL or other rules*	Check if meets rule <input checked="" type="checkbox"/>
Tanks storing diesel fuel must be labeled COMBUSTIBLE – KEEP FIRE AND FLAME AWAY (Fig. 12).	2003 & 1992	
If tank is not a fire-protected tank, then it must also say KEEP 40 FEET FROM BUILDINGS (Fig. 12).	2003 & 1992	
Tank guard posts and other equipment	Year of FL/CL or other rules*	Check if meets rule <input checked="" type="checkbox"/>
Concrete-filled, 4-inch diameter steel, 5 feet minimum length guard posts, spaced 4 feet on center. Each post set with 2.5 feet minimum above pad surface. Steel post placed in 12-inch minimum diameter concrete-filled hole. Posts conspicuously painted. (Figs. 4, 13, 14).	Not required, but recommended	
Fire extinguisher with minimum capability of 40-B-C located within 100 feet of the tank and fueling site.	Not required, but recommended	
Unused tanks	Year of FL/CL or other rules*	Check if meets rule <input checked="" type="checkbox"/>
If unused tank is present, it has been emptied, cleaned of liquid and sludge, rendered vapor free and safeguarded from trespassing.	2003	

* Rules other than FL/CL rules are specified, with date.



Fig. 3. Fifty-foot separation distance between private drinking water well and fuel tanks. Greater distance needed for Type III or Type IIb public well (dairy farm or farm with employees).

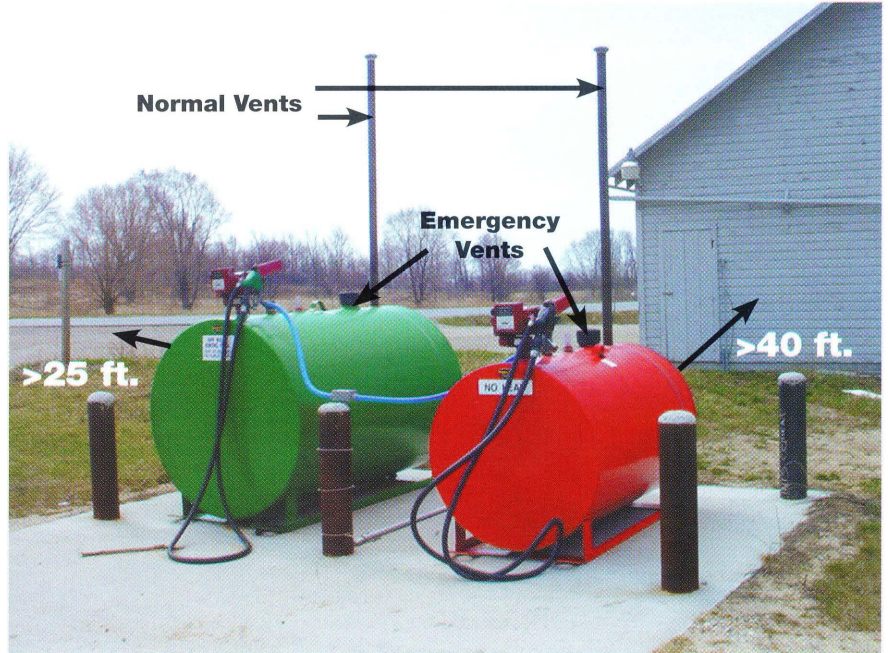


Fig. 4. Single-walled gasoline and diesel fuel tanks with emergency and normal vents. Note separation from public way and building; impervious surface for filling vehicles, equipment or containers; and guard posts to prevent vehicular damage to tanks.



Fig. 6. Here are two double-walled tanks and one single-walled tank with secondary containment. The two emergency vents indicate that the two tanks on the left are double-walled tanks, while the single-walled tank has only one emergency vent (hidden).



Fig. 5. Close-up of emergency vent.



Fig. 7. Example of required lockable fill opening on small tank.



Fig. 8. Automatic shut-off nozzle, with lock to prevent unpermitted users from contaminating your farm or causing fire hazard.



Fig. 9. Tanks and equipment must meet Underwriters Laboratory (UL) standards for the type of fuel and usage. Check the label.

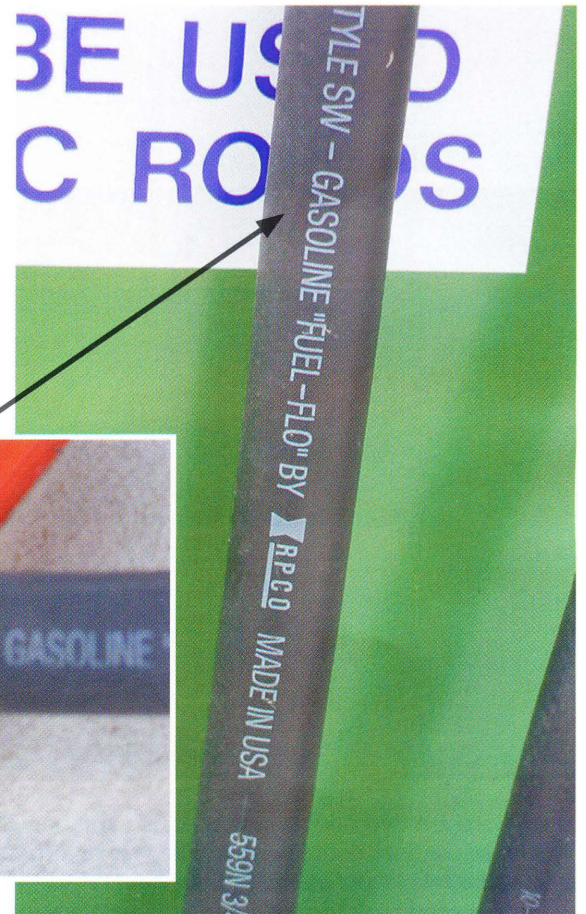


Fig. 10. Hose must be UL-listed/approved for the type of fuel.

Fig. 13. Gravity-release tanks with crash-protective posts and impervious surface filling site.



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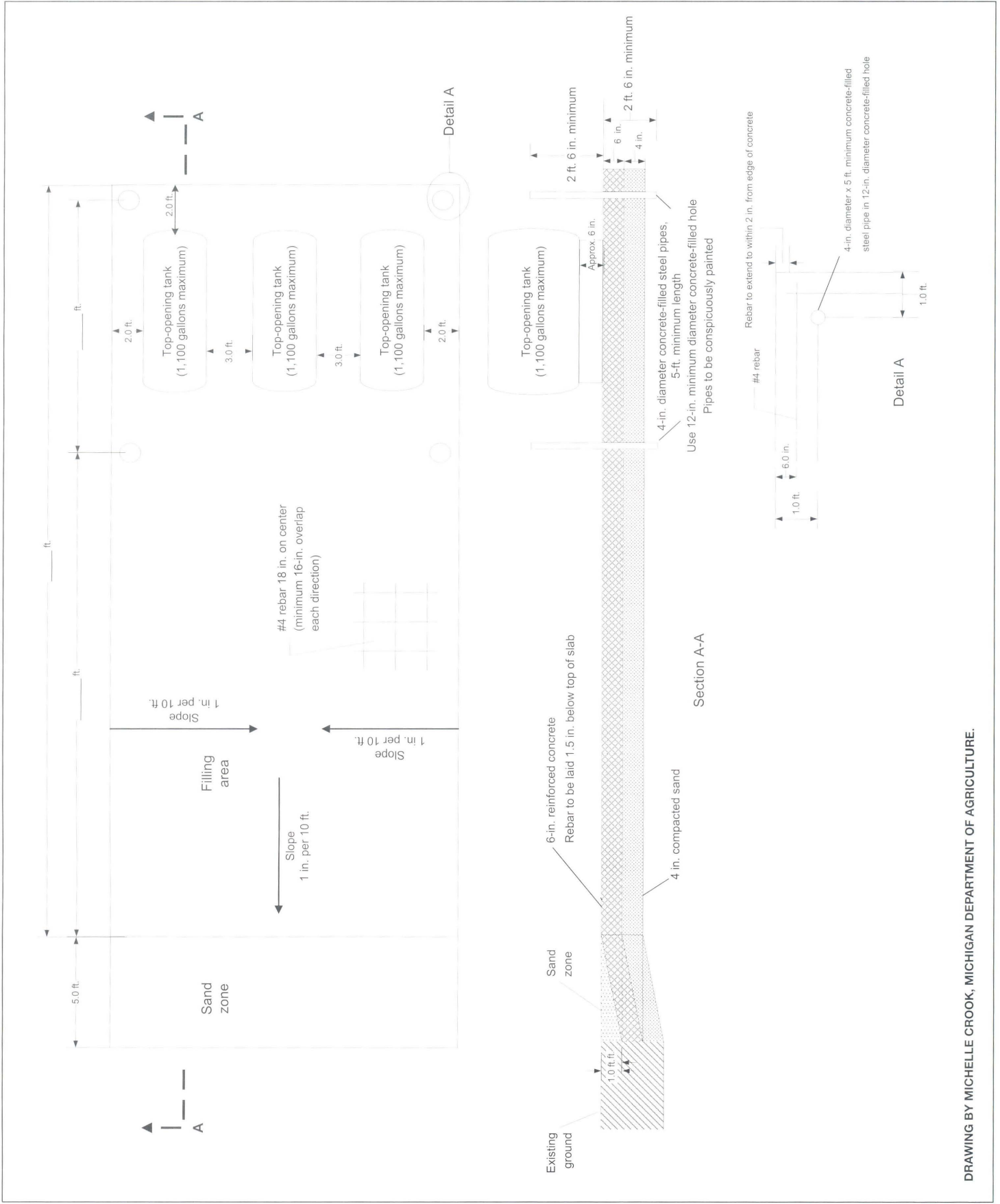


Fig. 14. Design for fueling site with three small tanks. Small spills run to center of pad and can be removed from pad with cat litter or other absorbent; larger spills are directed to sand zone for proper removal and disposal to prevent groundwater contamination. A double-walled tank is recommended for secondary containment. For fueling sites with fewer than three tanks, place tanks with minimum of 2 feet from edge and 3 feet between tanks. A maximum of 3 tanks are allowed per fueling site. *Drawing not to scale.*

Section II. Underground fuel storage tanks

Underground tanks were required to be upgraded by the MDEQ by November 1998. If your tank does not meet the rules outlined in **Table 4**, you may find it cheaper and easier to remove your underground tank and install a new aboveground storage tank.

Table 4. Underground storage tanks (small and large).

Tank design, construction and installation	Check if meets rule <input checked="" type="checkbox"/>
Tank(s) designed for underground usage and for the product stored.	
Material used to fabricate tanks is thick enough to compensate for internal corrosion and compatible with fuel stored.	
External corrosion protection for tanks is approved or listed corrosion-resistant materials or systems in accordance with: <ul style="list-style-type: none"> • <i>UL1316, "Standard for Glass-Fiber-Reinforced Plastic Underground Storage Tanks for Petroleum Products, Alcohols, and Alcohol-Gasoline Mixtures";</i> • <i>UL 1746, "Standard for External Corrosion Protection Systems for Steel Underground Storage Tanks";</i> or • <i>STI ACT-100, "Specification for External Corrosion Protection of FRP Composite Steel Underground Tanks, F894."</i> 	
Cathodic protection (corrosion protection) must be maintained by an inspection of an impressed current system not less than once every 60 days to make sure it is operational; an inspection not less than once every 3 years of the effectiveness of the cathodic protection system by a certified cathodic protection tester; an inspection of the effectiveness of the cathodic protection system within 6 months of any construction work that might damage the cathodic protection system. Repair(s) or replacement of a cathodic protection system shall be conducted by a certified corrosion expert.	
Selection of the type of corrosion protection to be employed shall be based on the corrosion history of the area and the judgment of a qualified engineer.	
Gas and gasohol tanks shall be equipped with venting devices that are normally closed except when venting under pressure or vacuum conditions.	
Tanks shall not be installed at a location where loads from adjacent structures of any kind can be transmitted to the tank.	
Each tank shall be anchored or otherwise prevented from movement if located in an area with flooding, a high water table or other buoyancy factors.	
Single-walled tanks without secondary containment may not be installed in a delineated wellhead protection area.	
Separation distances for single-walled underground tanks	Check if meets rule <input checked="" type="checkbox"/>
10 feet from any part of the tank to the nearest wall of any basement, pit or property line. A structure or foundation of a structure shall not be erected or constructed within 10 feet from any point on the tank surface, unless the footings extend to the bottom of the tank.	

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Table 4. Underground storage tanks (small and large) – cont.

<p>Separation distances for single-walled underground tanks, cont.</p>	<p>Check if meets rule <input checked="" type="checkbox"/></p>
<p>300 feet or more from single-family drinking water wells.</p>	
<p>800 feet or more from well on farm with one or more employees or a dairy farm well (Type III or IIb wells).</p>	
<p>2,000 feet or more from a Type I community well or type IIa non-community well.</p>	
<p>Separation distances for double-walled underground tanks</p>	<p>Check if meets rule <input checked="" type="checkbox"/></p>
<p>50 feet or more from a single-family drinking water well.</p>	
<p>75 feet or more from well on dairy farm or farm with one or more employees (Type III or IIb wells).</p>	
<p>200 feet or more from Type I public well or Type IIa non-community well.</p>	
<p>Separation distances for <u>fuel-dispensing device</u> and other requirements</p>	<p>Check if meets rule <input checked="" type="checkbox"/></p>
<p>10 feet or more from property lines, openings to buildings and buildings of combustible wall construction.</p>	
<p>20 feet or more between dispensing device and sources of ignition.</p>	
<p>Fuel dispenser splash guards are required except for class II (diesel) nozzles that are 1 inch or more in size.</p>	
<p>Fire extinguisher shall be located within 100 feet of each pump and storage tank fill pipe opening.</p>	
<p>Warning signs shall be conspicuously posted in the dispensing area and shall incorporate the following or equivalent wording: "WARNING. It is unlawful and dangerous to dispense gasoline into unapproved containers. No smoking. Stop motor. No filling of portable containers in or on a motor vehicle. The person shall remain in attendance outside of the vehicle and in view of the nozzle."</p>	
<p>Spill protection and testing requirements</p>	<p>Check if meets rule <input checked="" type="checkbox"/></p>
<p>Overfill and spill protection is required on the fill pipe to prevent releases into subsurface soils, groundwater and surface water.</p>	
<p>Tank tightness testing shall be capable of detecting a 0.1-gallon-per-hour leak rate while accounting for effects of thermal expansion of fuel, vapor pockets, tank deformation, evaporation or condensation, and location of the water table.</p>	
<p>A monthly monitoring method for leak detection shall be chosen.</p>	
<p>Splash guards are required for dispensing hose nozzles except for class II fuel (diesel) nozzles that are 1 inch or more in size.</p>	

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Table 4. Underground storage tanks (small and large) – cont.

Removal and disposal of unused tanks	Check if meets rule <input checked="" type="checkbox"/>
Tanks that are no longer used to store liquid shall be permanently closed.	
Before removal the owner shall notify the DEQ 30 days before the actual closure.	
Tank must be empty and clean of liquid and accumulated sludge and purged of all vapors.	
Tanks must be removed from the ground, or when a structure above or near the tanks prevents removal, filled with an inert solid material.	
Piping that is permanently removed from service shall be emptied of all liquids and sludge, purged and capped, or removed from the ground.	
All tank equipment (piping, gauging and tank fixtures, including vents) shall be disconnected and removed.	
All openings shall be plugged, leaving a 1/4-inch opening to avoid buildup of pressure.	
Tanks shall be removed from the excavated site and secured against movement.	
Tanks shall be labeled with their former contents, present vapor state, vapor freeing method and a warning against reuse.	
Tanks shall be removed from the site promptly, preferably the same day, and made unfit for further use by cutting holes in the tank heads and shell.	

Section III. Aboveground and underground large tanks (greater than 1,100 gallons)

Installing large (greater than 1,100 gallons) tanks requires a plan review by the MDEQ. A request for a plan review must include:

1. Size of existing tank(s), product stored, product flash point, the material of construction, the dimension and the capacity of each tank.
2. Type of diking and dike calculations with the available capacity calculated.
3. Completed parts and materials list for each tank with vent manufacturer, model number and flow rate.
4. Plot map showing proposed location of the tank (with loading fill connections and unloading dispensers) and the location of drinking water wells (private, community and/or noncommunity), buildings, public roadways, railroad mainlines, public sidewalks, property lines, storm sewers, sanitary sewers, manholes, catch basins, existing tanks (above- or underground within 50 feet of proposed tank), fuel dispensers and canopy footings, and surface water or wetlands (within 25 feet of proposed tank).

5. Separate piping diagram for each tank with pipe, vent and valve specification identified on the diagram. Need to include the manufacturer and model numbers where appropriate.

6. A plan review fee.

Within 30 days of the request for a review, the MDEQ will issue a plan review report. If a report is not issued within 30 days, the installation may be constructed according to the submitted plans and shall be in compliance with the FL/CL rules.

Upon completion of the installation and at least seven days prior to usage of the tank(s), the DEQ must be notified to inspect and certify the installation.

There is a fee for plan review (\$203) and an annual fee (\$61.50) thereafter.

Contact the MDEQ's storage tank unit for an example of a typical installation and for the form titled *Application for Installation of Aboveground (or Underground) Storage Tanks* (e-mail DEQ-STD-TANKS@Michigan.gov or phone 517-335-7211).

Section IV. Aboveground large tanks (greater than 1,100 gallons)

Some, but not all of the rules covering larger aboveground tanks are listed here in **Table 5**. Additional separation distance information can be found in **Table 6**. The plan review will help you address most of the large tank fuel storage issues on your farm.

Table 5. Aboveground large tanks (greater than 1,100 gallons).

Tank location	Comments	Check if meets rule <input checked="" type="checkbox"/>
Approved, published source-water protection area critical assessment zone or surface watershed delineated critical assessment zone.	Secondary containment required for tanks with 4,000-gallon capacity or less. More than 4,000-gallon capacity not allowed in these zones unless one-for-one replacement of active tank system.	
Separation distances needed for aboveground large tank systems separated from:	Minimum separation distance	Check if meets rule <input checked="" type="checkbox"/>
School, hospital, theater, mine shafts, mine air escape shafts, building with assembly occupancy of 50 or more persons.	300 feet	
Power lines (except service entrance and service line).	25 feet + 1 inch per 1,000 volts measured horizontally from the nearest conductor or power lines.	
Electrical lines.	May not be over a tank, loading or unloading area.	
Single-family drinking water well.	300 feet or more for tank without secondary containment or 50 feet or more with secondary containment.	
Type IIb or Type III noncommunity public drinking water wells (wells on dairy farm or farm with one or more employees).	800 feet or more for tank without secondary containment or 75 feet or more from tank with secondary containment.	
Type I community or Type IIa noncommunity public drinking water wells.	2,000 feet or more from tank without secondary containment or 200 feet or more with secondary containment.	
Separation distance for fuel-dispensing device and other requirements		Check if meets rule <input checked="" type="checkbox"/>
10 feet or greater from property lines, openings to buildings and buildings of combustible wall construction.		
20 feet or greater from any source of ignition.		
Fire extinguisher shall be located within 100 feet of each pump and storage tank fill pipe opening.		

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Table 5. Aboveground large tanks (greater than 1,100 gallons) – cont.

<p>Labeling of aboveground large tanks and other signage</p> <p>Tanks must be labeled with at least 3-inch-high letters according to the contents in the tank: Gas, Gasohol, Diesel or NFPA numbers. For gas or gasohol: FLAMMABLE LIQUIDS—KEEP FIRE AWAY. For diesel fuel: COMBUSTIBLE LIQUIDS—KEEP FIRE AWAY. Labeling the tank with its contents—i.e., gas, gasohol or diesel—will prevent misfilling of the tank and/or farm equipment.</p>	<p>Check if meets rule <input checked="" type="checkbox"/></p>
<p>“No smoking” signs shall be conspicuously posted where hazard from flammable vapors may be present.</p>	
<p>Warning signs shall be conspicuously posted in the dispensing area and shall incorporate the following or equivalent wording: “WARNING: It is unlawful and dangerous to dispense gasoline into unapproved containers. No smoking. Stop motor. No filling of portable containers in or on a motor vehicle. The person shall remain in attendance outside of the vehicle and in view of the nozzle.”</p>	
<p>Other requirements for aboveground large tanks</p> <p>Spill control on tank fill connections (spill bucket) (Fig. 11).</p>	<p>Check if meets rule <input checked="" type="checkbox"/></p>
<p>Tank designed and built for type of usage and type of fuel stored.</p>	
<p>Area around tanks, including dike and piping, secured by locking valves, locking electrical controls for pumping equipment or metal fence. If metal fence, then chain-link fence (6 feet or higher) with gate that is secured to protect against unauthorized entry. Fence separated from tank by at least 10 feet.</p>	
<p>If property around tank has a perimeter security fence or tank is located in vault with protection from unauthorized entry, then additional chain-link fence not required.</p>	
<p>Non-vaulted tanks must have barriers for protection from vehicular collision. Acceptable barriers: guard posts of steel not less than 4 inches in diameter and filled with concrete, spaced not more than 4 feet on center, each set not less than 4 feet deep in a concrete footing that is not less than 15 inches in diameter.</p>	
<p>Any portion of tank or piping in contact with the soil shall have maintained corrosion protection and must be tested before being placed in service.</p>	
<p>Tank must have some form of secondary containment, may use remote impounding, diking, vault or double walled tank.</p>	
<p>Fuel dispenser splash guards are required except for class II (diesel) nozzles that are 1 inch or more in size.</p>	
<p>Area beneath each dispensing device shall be provided with a liquid-tight sump that will prevent any leaks in the dispensing device from reaching groundwater, surface water or subsurface soils.</p>	
<p>Smoking materials, including matches, lighters and other sources of ignition, including torches, shall not be used within 20 feet of areas used for fueling or receiving or dispensing of Class I liquids. Motors of equipment being fueled shall be off during fueling.</p>	

Table 6. Minimum separation distances for aboveground large tanks, various sizes

Tank type	Individual tank capacity (gallons)	Minimum distance from nearest important buildings on the same property	Minimum distance from nearest fuel-dispensing device	Minimum distance from lot line that can be built upon, including opposite side of a public way	Distance from the nearest side of any public way	Minimum distance between tanks
Single-walled tank(s) in vault (up to 15,000 gallons capacity).*	Up to 15,000	15 feet	0 feet	15 feet	10 feet	one tank per vault.
Fire-protected tank(s) (UL2085).**	6,000 or less	5 feet	0 feet	15 feet	5 feet	3 feet
	6,000-16,000	15 feet	0 feet	25 feet	10 feet	3 feet
Single-walled tank(s) in dike or double-walled tank(s).	Up to 12,000	40 feet	50 feet	100 feet***	25 feet	3 feet

* Separation distances given for a vault are measured from the outer perimeter of the vault.

** Fire-protected tanks are also double-walled.

*** This distance may be reduced to 50 feet for fleet vehicle motor dispensing.



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