

Petroleum Storage

INTRODUCTION

The purpose of this fact sheet is to describe environmentally safe practices for the storage of petroleum products.

Petroleum tanks are used on the farm to store gasoline and diesel fuel. Properly designed petroleum storages must prevent leaks and the potential contamination of soils, surface water or groundwater. Even a very small leak is enough to contaminate millions of litres of water.

Cleanup of surface water or soils may be difficult and it may be impossible to clean up contaminated aquifers. Cleanup could involve the removal of tonnes of contaminated soil which must be sent away for remediation. A single petroleum storage leak and the related cleanup costs could jeopardize the survival of the farm operation. Insurance companies are increasingly reluctant to cover large remediation expenses in their policies. They may require that petroleum storage tanks be properly installed, meet all codes, be outdoors and be double-walled or have a secondary containment.

SITE SELECTION AND TECHNICAL CONSIDERATIONS

Ensure that all applicable regulations or guidelines regarding petroleum storages are followed. Any required permits should be obtained before tank installation.

Site selection

Choose a site away from other stored chemicals and combustible materials.

- Floodplains or sites with a high water tables should be avoided.
- Soils with a high water infiltration rate pose a greater risk for groundwater contamination.
- Conversely, soils with a slow water infiltration rate pose a greater risk of runoff contaminating surface water.

Minimum separation distances

Petroleum storages should be located a safe distance away from wells, watercourses, farm ponds, lakes, or wetlands. The regulations or guidelines in your province should be consulted for the required minimum separation distances.

For fire prevention, safe separation distances should also be maintained:

- From houses, dwellings, property lines.
- From other farm buildings.

You should also consult your insurance company for its requirements for safe separation distances.

Types of storage tanks

The installation of underground storage tanks is not recommended.

Most farm petroleum storage tanks are above-ground, single-walled, horizontal storage tanks. Such tanks should have secondary containment systems to retain any leaks.

Double-walled, vacuum monitored tanks have a vacuum between the two walls. If the gauge indicates that the vacuum has been lost between the two steel walls, then there is a leak in one of the walls.

Double-walled tanks are frequently found to be a good option for smaller farm operations.

All tanks must have a corrosion protection coating and/or be primed and painted to prevent rusting.

Use only petroleum storage tanks that are approved by accredited standards development organizations (e.g. Underwriters Laboratories of Canada [ULC], Canadian Standards Association [CSA], or Canadian General Standards Board [CGSB]). All fuel tanks should be located outside of buildings used for other purposes.

Security

A switch or timer to turn off power to the pumps can be used to prevent spills, theft or accidents. The main shutoff switch for an electric fuel pump could be inside an adjacent building, with a light that indicates that the switch is on. Petroleum storage tanks should be firmly fixed in place and the pumps, dispensers, valves, fill and vent caps should be locked. Tanks could also be within a locked petroleum storage building or behind a locked fence.

GENERAL PLANNING AND DESIGN CONSIDERATIONS

Petroleum storages should be constructed in accordance with accepted engineering specifications and construction standards, and should be installed by licensed tank installers. Double-walled tanks should have posts, Jersey barriers or guardrails in front of them to protect the tanks from vehicles.

- 10 cm steel pipe posts set in concrete are a good option. The posts should be painted or identified with reflective tape.

All tanks should be raised to at least 15 cm on steel feet with concrete anchors to prevent contact with the ground and resulting corrosion. Placing tanks any higher on elevated structures is not recommended due to their tendency to collapse (particularly wood structures), tip over, accidentally drain or get hit by vehicles.

Secondary containment

Single-walled storage tanks must be installed in an impervious secondary containment with a minimum holding capacity of 110%.

- The containment area may also be roofed or have rain shields.
- Containment floor surfaces should extend 30 cm beyond the edge of the tanks in order to collect any drippings and enable visibility of all parts of the tanks for a visual leak inspection.

Secondary containments are generally not considered necessary for double-walled tanks. However, secondary containments can provide an extra level of protection, particularly when the tanks are located in a sensitive area.

Electrical and lighting

All electrical installations and equipment at the fuel storage must comply with electrical codes. In particular, all electrical connections (including the dispensing equipment):

- Must be in explosion-proof fittings.
- Must be installed by a qualified electrician.
- Should be inspected by an electrical inspector.
- Should be approved by your insurance company.

There should be no overhead electrical lines for reasons of fire safety. Adequate lighting should be provided for safety signs to be read and for fueling of vehicles.

Petroleum storage tank enclosures

Petroleum storage tanks may also be partially or completely enclosed. This enclosure will keep precipitation from collecting in the secondary containment, protect the tanks from corrosion, and protect the tanks from sunlight.

Precast concrete and steel fuel storage containments with roofs are also available.

Fumes and ventilation

Petroleum storage fumes are toxic and flammable. The storage building should have natural ventilation rather than an electric fan because sparks from electrical wiring or switches could cause petroleum vapors to explode. The storage building should have 30 cm (12 inch) continuous natural vents around the top and bottom of the walls, and ridge vents.

- Petroleum storage tanks should have separate fill and vent openings, and the vent openings should have weatherproof caps.
- All fill or vent pipes should be steel. The vent should be a minimum of 3.2 cm (1.25") in diameter.
- If the petroleum tanks are in an enclosed building, then the tank vents should extend outside.
- Vent pipes for petroleum storage tanks should be at least 3.5 meters above ground level, higher than the fill pipe, above the normal snow level, and at least 1.5 meters from any building openings.
- All tanks should have an emergency relief vent. It should not be locked.

RECOMMENDED PETROLEUM STORAGE MANAGEMENT PRACTICES

Warning and safety signage

Petroleum storage tanks should be labeled on at least one side (preferably both) with the name of the product stored in the tank (gas, diesel or waste oil etc.). The words **"Flammable - Keep Fire and Flame away"**, and **"No Smoking - Ignition Off"** should also appear on the tank. These warning signs should be visible when refueling.

Monitoring for leaks

Any unwanted discharge may be considered a leak, however small. Any loss may be considered a spill. As little as a few drops an hour can be enough to contaminate surface water and groundwater.

Check petroleum tanks regularly for rust and potential leaks. This should include a weekly:

- Visual inspection for potential leaks and corrosion.
- Inspection of the secondary containment and/or vacuum gauge for any signs of a leak or spill.
- Measurement of the liquid level in the tank that is verified against a fuel inventory log or use records to detect tank leaks. *However, petroleum inventory or consumption records will not detect small leaks.*

Dispensers

Fuel should never be dispensed from a storage tank through gravity flow.

The tank dispenser should be equipped with:

- A metered electric pump assembly that should have a CSA-approved motor and a ULC pump.
- An ULC-approved or CSA-approved nozzle.
- Self-latching nozzles that automatically shut off when the tank is full or if the handle is released.
- An anti-siphon check valve between pump and tank to prevent the tank from draining if the line is broken, or if the nozzle is dropped or left lower than the fuel level in the tank.

A hand pump is an acceptable alternative to an electric pump.

The hoses must also be ULC approved. Approved heavy duty hoses are less flexible, which reduces the possibility of cracks or kinks. The hoses should also have a wire embedded in the length of the hose to ground against static sparks for fire prevention.

Dispensing equipment should be inspected monthly to ensure all connections, hoses and fittings are not cracked or leaking. Any leaking equipment should be replaced immediately.

Spill cleanup

All leaks should be reported to the appropriate authorities.

All spills of any quantity should be cleaned up immediately using proper procedures, which include:

- Stopping and containing the spill or leak.
- Cleaning up the affected area.
- Collecting used absorbent materials and safely storing them in a container (e.g. open-ended barrels) until they can be safely disposed of.

There should be spill cleanup material available at the petroleum storage site. Materials to absorb or contain an accidental spill may include sawdust, kitty litter, sand, or soil. Oil spill response kits are also commercially available.

Fire safety

Petroleum storage tanks must meet all provisions under provincial fire regulations.

Fuel tanks should be located away from other storages containing chemical or fertilizer products to minimize fire hazards.

A dry chemical ABC fire extinguisher should be maintained and readily available at the storage site. This extinguisher is only for the control of fires in combustible materials near the petroleum storage. Petroleum storage fires should be handled by trained firefighters.

Emergency preparation

Petroleum storage and handling should be addressed in the farm's emergency plan. A simple emergency preparedness and response plan should be established that provides a timely and effective response to petroleum storage emergencies involving fires, leaks or spills. Emergency telephone numbers should be posted in a permanent place. This information could also be kept in a pole-mounted emergency response tube, where permitted.

CONCLUSION

Following the petroleum storage practices recommended in this fact sheet will help reduce the environmental risk of contamination of soils, surface water or groundwater.

REGULATORY ENVIRONMENT

The owner or operator of a petroleum storage site must ensure that it meets all federal, provincial, municipal and rural legislation, regulations, orders and bylaws. These include:

Federal

Canadian Environmental Protection Act
<http://laws.justice.gc.ca/en/C-15.31/>

Fisheries Act
<http://laws.justice.gc.ca/en/F-14/>

National Farm Building Code of Canada, 1995
<http://www.fedpubs.com/subject/housing/natfarm.htm>

Provincial

Newfoundland and Labrador Environmental Protection Act
The Storage and Handling of Gasoline and Associated Products Regulations, 2003.

<http://www.hoa.gov.nl.ca/hoa/regulations/rc030058.htm>

Newfoundland and Labrador. **The Storage and Handling of Gasoline and Associated Products Regulations**, 2003, Registration brochure.
http://www.env.gov.nl.ca/env/Env/PollPrev/petroleum_storage/GAP%20Registration%20Brochure.pdf

Nova Scotia Petroleum Management Regulations.
(Environment Act)
<http://www.gov.ns.ca/just/regulations/regs/envpetma.htm>

New Brunswick Clean Environment Act, Petroleum Product Handling and Storage Regulation
<http://www.gnb.ca/0062/regs/87-97.htm>

Petroleum Products Act
www.irac.pe.ca/legislation/document.asp?f=PetProductsAct.asp

Prince Edward Island Petroleum Products Act Regulations
<http://www.irac.pe.ca/legislation/document.asp?f=PetroleumProductsActRegulations.asp>

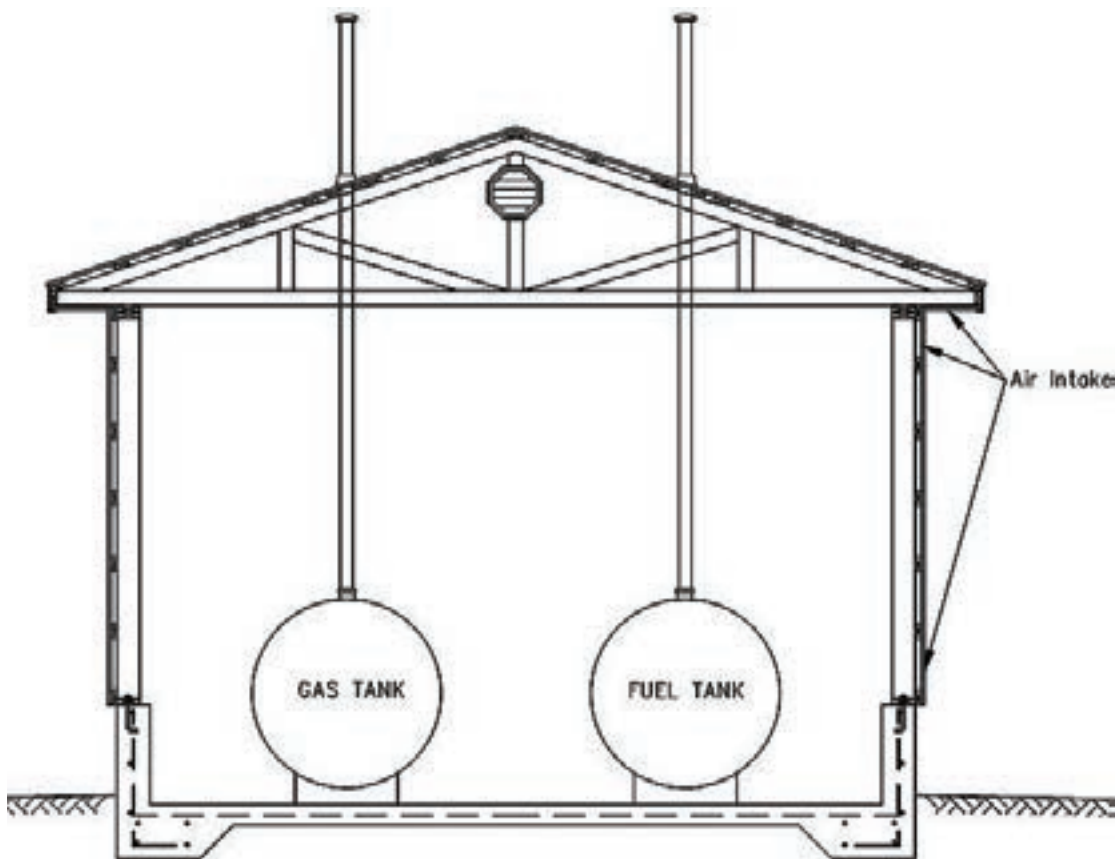
ADDITIONAL INFORMATION

The following references may provide additional information and/or contacts:

1. Newfoundland and Labrador Department of Agrifoods. 1998. **Storage and Handling of Petroleum Products on the Farm.** http://www.nr.gov.nl.ca/agric/fact_pubs/soillandpub.stm
2. Nova Scotia Environmental Farm Plan. 2005. **Farm Fuel Storage and Handling.** Nova Scotia Environmental Farm Plan Factsheet.
<http://www.nsfa-fane.ca/content%5Cenvironment%5Cefp%5Cfactsheet%5Cfuel.pdf>
3. New Brunswick Department of Environment. **Petroleum Storage Tanks.** <http://www.gnb.ca/0009/0373/0001/0012-e.asp>
4. Prince Edward Island Department of Agriculture, Fisheries and Aquaculture. 2005. **Fuel Storage.** <http://gov.pe.ca/af/agweb/index.php3?number=74702>

Acknowledgements

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Example cross-section of petroleum storage building