Machines and equipment that run on liquid fuels — including vehicles — are part of everyday life. This assessment helps you identify potential risks to the environment and to your family's health due to how fuels are stored and managed. This assessment is divided into two parts:

1. Portable Fuel Containers. **Fuel stored in portable containers, and in the "gas tanks" of gas-powered machines, is a potential risk to groundwater and surface water. If you own any of the following, this part of the assessment applies to you.**

- **Lawn mower**
- **Snowmobile**
- **Motorcycle**
- **Weed trimmer**
- **Motor boat**
- **Auxiliary generator**
- **Indoor space heater**
- **Snow blower**
- **Chain saw**
- **Camp stove**
- **Yard blower**
- **Space heater**

2. Aboveground, Underground, and Basement Storage tanks. **The second part of the assessment is for homeowners with aboveground, basement or underground fuel tanks — active or inactive — on their property.* This part examines:**

- **tank location**
- **tank management**
- **tank removal & abandonment**

Home*A*Syst
for New Jersey

Liquid Fuels

Safe Management of Gasoline, Heating Oil, Diesel and Other Fuels

**This assessment applies to residential tanks that hold less than 1,101 gallons. All residential heating oil underground storage tank systems with a total capacity less than 1,101 gallons and small above ground storage tank systems are not regulated by New Jersey or federal law. However, small tanks are required to have permits for installation and removal from your local construction inspection department. Larger tanks or those used for business purposes are subject to greater regulation and not addressed in this publication. This assessment does not cover the storage of liquified gases, such as liquid propane (LP) and liquid natural gas.*

What are the environmental and health concerns?

You may not have thought much about how you store gasoline, heating oil and other fuels on your property. If you are like most people, you own at least one fuel burning device such as a lawnmower, and probably keep fuel in portable containers holding one to five gallons. For home heating and vehicle use, you also may have larger quantities of fuel kept in underground, basement, or aboveground storage tanks.

Fuels are hazardous materials. Improperly managed, they can pollute the water you drink and the air you breathe. It is critical to prevent repeated spills and leaks. As little as one gallon of gasoline can quickly contaminate groundwater above drinking water health

advisory levels. Petroleum products contain many toxic compounds — including benzene, which is known to cause cancer. You cannot depend on taste or smell to alert you about fuel in your drinking water. Leaks can come from unexpected sources. Unknown or forgotten underground tanks have come back to haunt property owners.

Contaminated soil and water can rob your property of its value, trigger environmental liability and costly cleanups, and drive away lenders and property buyers. Vapors from fuel can ignite fires or collect underground and explode.

Fuel stored in large tanks poses greater risks of contamination than the small quantities stored for power equipment. While you should pay particular attention to high potential risks from large tanks, you should recognize that fuel storage in any amount increases the environmental risks around your home.

This easy-to-use worksheet can help you evaluate how you manage liquid fuels, identify areas of risk, and develop an action plan to reduce or eliminate potential problems. Improving fuel storage and management has many payoffs. It protects the health of your family, your community and the environment. Better management also can safeguard your biggest investment—your home.

Part 1 — Handling Small Quantities of Fuel

Review the following tips for safe management, and answer the assessment questions below.

How much fuel do you buy and use?

It is best to purchase and store minimum amounts of fuel for short periods. This means buying in small quantities, and not buying more than you need for use in a season (6 months or so) of lawn mowing or snow blowing. Do you have more than a gallon of leftover fuel at the end of a season? Next time buy smaller quantities. If there are leftovers, try to use them up. Excess gasoline can be poured into a car's gas tank, for example, or given to someone who can use it. Dilute one part old fuel with five parts new fuel to protect your engine. Beware of oil-blended fuels which should be used only in engines designed for this fuel. Extra gas left in equipment at the end of a season should be drained and reused. Fuel stabilizers may extend the shelf-life of fuels.

Do you store fuels in approved containers?

It is important to use only safe, approved containers to store fuels. Containers that are UL-approved (red for gasoline, blue for kerosene and diesel) can be purchased in places as convenient as your local hardware store. The container should be clearly labeled to identify its contents and fitted with a spout or other device to allow pouring without spilling. Storing fuels in uncovered or unapproved containers is dangerous. For an extra measure of spill protection, fuel containers can be kept inside a bucket or other container that can prevent leaks from spreading.

Are containers kept in a well-ventilated, safe place?

To avoid fuel vapors — which are a health hazard and fire danger — keep fuel containers and fuel powered devices in secure, well ventilated places. Storage in an unattached shed or garage is safer than storage in a garage attached to your home or in a basement. Keep containers off the floor where they can be damaged by your car. Keep them out of reach of children and make sure the lids are tight to prevent easy access.

Figure 1. Use only UL-approved or original sale containers to store fuel. Storing fuel in an unapproved container, such as a glass jar or plastic jug, is dangerous and unlawful.

ASSESSMENT 1 — Portable Fuel Containers

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Container safety	UL approved container.	Fuel in original sale container.	Non-approved containers (like glass or open containers).	
Storage location	Unattached garage or shed away from house. Well-ventilated area with concrete floor.	Garage attached to house. Poorly ventilated area.	Inside home or in basement. Dirt floor is least safe.	
Quantities stored	Moderate amounts purchased. Fuel stored for less than 6 months.	Fuel kept more than 6 months before use.	Excess quantitied purchased and kept for more than 12 months before use.	
Management and disposal	Used up in devices.	Stored on site indefinitely or evaporated.	Poured down house drain, storm drain, on ground, or sent to landfill.	

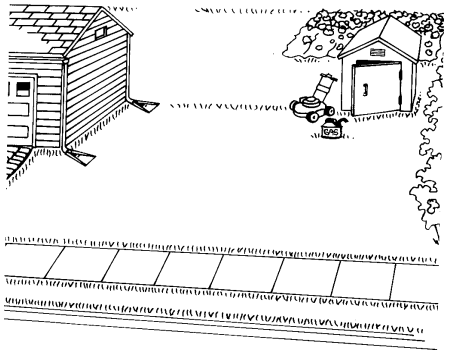

Figure 2. Storing fuel in an unattached shed or garage is safer than storing it in an attached garage or basement.

Do you check on your fuels or machinery regularly?

Periodically check for leaks from storage containers and fuel driven devices, especially if they have not been used for some time. A small leak can add up over time. You can keep on top of things with regular inspection and maintenance. Always recycle or safely dispose of engine maintenance products. (See the Home-A-Syst worksheet on *Managing Hazardous Household Products).*

Assessment 1 — Portable Fuel Containers

Check all the places where you store fuels — garage, basement, or shed — and examine how they are stored. Use the chart above to evaluate your practices. Some choices may not match your situation exactly, but answer as best you can. Put the number (1, 2, or 3) of your choice in the column labeled Your Risk. Refer to Part 1 above if you need more information to complete this chart.

Responding to Risks

Your goal is to lower your risks. Turn to the Action Checklist on page 89 and record the medium and high risk practices you identified above. Use the recommendations in Part 1 above to help you plan actions to reduce your risks. On the Checklist, write down changes you plan to make, as well as a schedule for making these changes. You don't have to do everything at once, but try to eliminate unsafe conditions first. If you need more information, contact local fire officials.

Part 2 — Aboveground, Underground and Basement Storage Tanks

It is vital to know about fuel storage tanks on your property — including tanks in current use and those that are abandoned. As a tank owner, you have many responsibilities and must keep up with increasingly strict laws. You are financially responsible for leaks from a tank on your property, even if you are unaware of the tank's existence. Standard homeowner's insurance does not typically cover the costly cleanups. You may want to consider a separate insurance policy to cover fuel leaks.

Part 2 is divided into three sections:
2.1 Tank location
2.2 Tank management
2.3 Tank removal & abandoned tanks.
Review the information in each section, then answer the assessment questions that follow.

2.1 — Tank Location

This section covers both aboveground and underground tanks, but not basement storage tanks — answer only those questions that apply to you. Remember to assess each tank separately.

How far is your tank from wells and surface waters?

One hundred feet is the recommended minimum distance between your tank and nearby wells, but the greater the distance, the better. Other factors can influence the risk related to distance. Tanks are safer when located downslope (downhill) from wells. Certain soil types—such as sandy soils —allow pollutants to seep more rapidly into groundwater. The 100 foot minimum also applies to the distance from streams, wetlands, ponds and other surface waters.

For each high risk tank, consider removing or moving it to a location as far from wells and surface waters as possible. If a tank must be near a well or water, aboveground tanks are preferred. Never try to convert an underground into an aboveground tank or vice versa. For professional assistance, look in the yellow pages under Tank, Environmental, Petroleum, or Excavating. If it is not possible to remove high risk tanks, be extra careful to monitor them for spills and leaks.

What is the distance to the water table?

If you dig straight down—in most places—you will eventually reach water. This "water table" may be a few feet to hundreds of feet down. This distance is important for several reasons. When water is close to the surface, there is greater chance for it to come in contact with the steel walls of a tank. In wet conditions, corrosion of metal is more likely to occur, particularly if your soil has corrosive properties. Spills reach ground water more quickly if the water table is close to the surface. Your tank may be exposed to similar water problems during flooding.

You can get help finding out about your water table from agencies such as the United States Geological Survey or businesses such as well drillers. If you do not know how deep your underground tank is buried, assume it is no more than 10 feet. Again, for each high risk tank, consider relocating the tank or removing it (which requires a permit from your county construction department). The cost of moving it today may be far less than paying for a cleanup in the future.

Assessment 2.1 — Tank Location

For the assessments in Part 2, start by gathering basic information. How many tanks do you have and where are they located? Assess each tank separately. Using records or your memory, reconstruct the history of each tank. When was it installed? Has it been serviced or inspected? Unless you know for sure, it is best to check for inactive underground tanks.

Evaluate your situation using the chart on the following page. Put the number (1, 2, or 3) of your choice in the column labeled Your Risk. Refer to Section 2.1 above if you need more information.

ASSESSMENT 2.1 — Tank Location

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Distance from well	Greater than 100 feet from water well.	Between 50 to 100 feet from water well.	Less than 50 feet from water well.	
Distance from surface water	Greater than 100 feet from wetland, stream, river, or other waterbody.	Between 50 to 100 feet from wetland, stream, river, or other waterbody.	Less than 50 feet from wetland, stream, river, or other waterbody.	
Water table level	Water table (distance to groundwater) consistently more than 10 feet below the surface.	Water table consistently between 5 and 10 feet below the surface.	Water table consistently 5 feet or less below the surface.	

Responding to Risks

Turn to the Action Checklist on page 89 to record medium and high risk practices. Use the recommendations in Section 2.1 to help you plan actions to reduce your risks.

2.2 — Fuel Tank Management

This section deals with all three types of tanks (aboveground, underground and basement). In the information below, review the parts that apply to the tanks you have.

Is your tank old and possibly leaking?

This is your highest concern. Buried tanks over 15 years old have a dramatically higher chance of leaking. The New Jersey Department of Environmental Protection strongly recommends that older tanks, especially those over 20 years in age, be replaced if they are not corrosion protected or at least tested for leakage. But even newer tanks and piping can leak, especially if they were incorrectly installed.

Corrosion protection helps keep steel tanks from leaking. Most older tanks do not have this protection and are at high risk for leaks. It is expensive to put corrosion protection on existing tanks and it may be more cost effective to replace them. New underground tanks should have corrosion protection such as interior tank liners, protective coatings on the tank exterior, and cathodic (electric chemical) protection. Fiberglass tanks do not corrode but are vulnerable to other problems.

Have you checked pipes and hoses?

The pipes, hoses, valves and fittings connected to a storage tank can be a major source of leaks. They are often overlooked, especially if buried underground. Here, too, age is a factor. Piping fails because of corrosion, accidents, and weather related factors such as frost heaving. Professional installation and inspection is your key to avoiding problems.

How will you detect leaks?

You have several tools at your disposal to detect leaks. Leak detection is more complicated for underground storage tanks and is critical for tanks older than 15 years. Set up a schedule for regular leak and damage inspection of all tanks, including heating oil tanks in your basement.

What signs of trouble should you look for?

Environmental Changes. Your senses—sight, smell and taste—are an important part of your leak detection plan. Is there an unexplained oil-like substance on streams or wet places near the tank? Is nearby soil stained with petroleum? Is there a strong and constant smell of petroleum near your tank? Have you or your neighbors smelled fuel odors near plumbing or sewer line openings, or in base-

ments, or have you tasted it in your drinking water? Normally you can see leaks from an aboveground tank, but you should be aware of leaks in areas you cannot easily see, such as where the tank is in contact with the ground.

Mechanical Changes. Be aware of unusual or changing operating conditions at the pump. Does your suction pump rattle, and does fuel flow unevenly? Does the pump hesitate too long before dispensing? These may be signs of leaks or damage to the piping.

Have you pressure-tested your tank?

One method of detection is called tank and pipe testing or "tightness testing." This involves placing the tank, piping and contents under pressure and checking for leaks. It is strongly recommended that tightness tests be performed periodically, especially for older tanks and those in sensitive areas. Many tank owners choose to pull their underground tanks (which requires a permit from your county construction department) rather than do this testing.

Do you keep track of fuel levels in the tank?

A simple, less expensive way to check for significant leaks is to monitor the level of fuel over time. Measure precisely the amount of fuel in the tank each month and compare to the amount of fuel delivered and dispensed. Differences in your records may indicate a leak. This method is not always accurate, and small leaks will be missed. Underground tanks for heating fuel, because they dispense automatically when in use, are best monitored in summer. If you suspect a problem, contact your local fuel supplier.

Who Are You Going To Call?

For more information on leak detection and for names of approved tank testing methods and suppliers, contact a representative from your fuel supplier.

What spill protection actions have you taken?

Overfilling a vehicle is the most common—and most avoidable—cause of spills. Never walk away while filling a vehicle with fuel. Close supervision of fuel transfers is one of your best forms of protection. Automatic shutoff devices are available to prevent spills but are not suitable for every tank. Spills resulting from overfilling basement (home heating fuel) tanks can be reduced by installing a vent whistle or fill level indicator. Ask a tank or fuel supplier about these devices.

Box like containment structures for aboveground tanks can prevent leaks and spills from spreading. Even if the entire contents of a tank leaks, well-designed containment should keep it from escaping. You can construct a concrete dike and pad, or purchase special structures made for this purpose.

If you find a leak or spill from any tank - whether it be above or below ground - you must notify the 24-hour New Jersey Department of Environmental Protection's Environmental Action Hotline at (609) 292-7172, your local fire department, and your local health department.

Is your fuel secure from theft?

Preventing access to your gasoline and diesel pumps protects against theft and lowers pollution risks. Unauthorized users can damage your tank or spill fuel. The simplest form of security is to lock your pump. Enclosing an aboveground tank within a six-foot locked fence offers more security.

Are your tanks protected from accidents and damage?

Aboveground tanks can leak if they are not well supported or protected from damage by vehicles and other objects. Tanks should be placed on a solid, stable base or on footings made of brick, cinder block or concrete that resist changes in soil moisture and frost heaving. In your basement, do not store anything around or under a heating oil tank. Heavy objects can damage pipes. If your tank is located in a garage or outdoors, it needs to be protected from damage by your vehicle. If it is not enclosed in a structure, install posts or other barriers around it.

Assessment 2.2 — Tank Management

Evaluate your situation using the chart on the next page. Read the lefthand column

ASSESSMENT 2.2 — Tank Management

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Age of your underground tank (gasoline, diesel, or heating oil)	Metal underground tank less than 15 years old and protected from corrosion OR synthetic tank (fiberglass).	Metal underground tank less than 15 years old and not protected from corrosion.	Metal underground tank more than 15 years old.	
Leak detection procedures (primarily for underground tanks)	Regular tank tightness testing and monthly fuel use accounting.	Fuel use accounting.	No testing or fuel use accounting.	
Spill and overfill protection (for gasoline or diesel)	Close supervision during filling.	Automatic shut-off.	Unattended filling.	
Tank containment (above ground tanks)	Tank on containment pad/dike capable of holding 125% of tank volume.	Tank on impervious surface without berm or dike for containment.	No protection to contain major leaks and spills.	
Tank security (for gasoline or diesel)	Tank or pump surrounded by a six-foot locked fence with a lock on the pump.	Fill hose locked.	No fence or enclosure and no locks.	
Damage protection (above ground and basement tanks)	Tanks and pumps on stable concrete or steel supports. Well protected from damage by impact.		Tanks in contact with the ground or on poor footings. Tank not well shielded from impact.	

to see which questions apply to you. Put the number (1, 2, or 3) of your choice in the column labeled Your Risk. Refer to Section 2.2 above if you need more information.

Responding to Risks

Use the Action Checklist on page 89 to record the medium and high risks identified above.

2.3 — Tank Removal & Abandoned Tanks

Unused tanks may pose the greatest potential risks to health, the environment and financial assets. Sometimes old pumps or fill pipes reveal the location of forgotten tanks. Former owners of the property, neighbors, or local fuel suppliers may be able to help.

What should you do with an abandoned tank?

Inactive tanks remain an environmental threat until removed. Emptying and filling them with inert material like sand or cement is one solution, but your best environmental and legal protection is to remove the tank and check the soil and groundwater for contamination. Local construction code officials or fire officials must be contacted prior to closure of a tank for information on local ordinances and permits. You should hire a professional to remove your tank, as it is a dangerous activity that can kill or injure non-experts. Contractors can help you dispose of the tank at a landfill or with a scrap dealer.

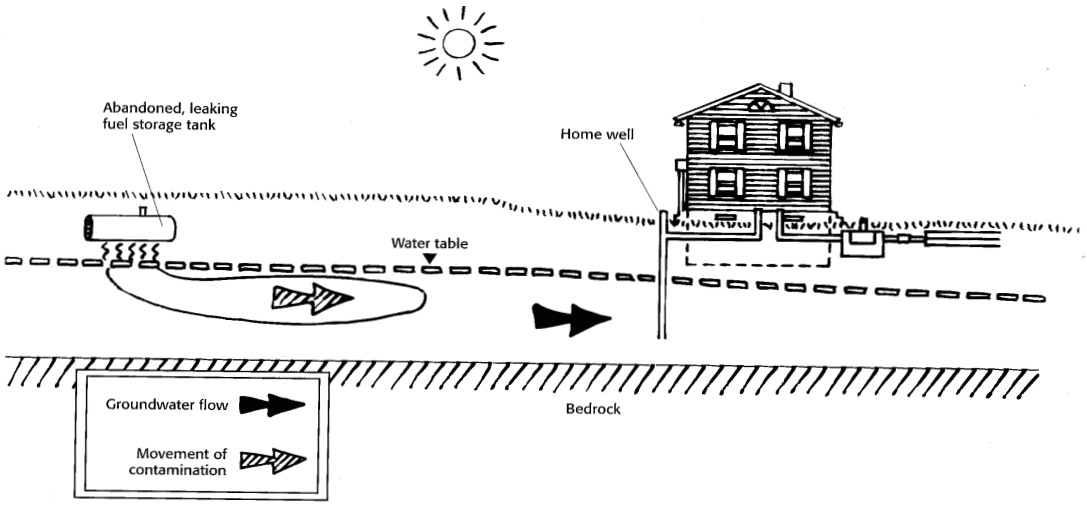

Figure 3. Abandoned fuel tanks on or near your property may be an unseen source of groundwater contamination.

What if contamination is discovered?

Tank owners may discover leaks when a tank is removed. Soil around and under a tank should be inspected for obvious signs of leaking — odors, stains or visible fuel. If you suspect contamination, a more extensive site assessment should be promptly arranged. Whenever you find a leak, you will be required to follow state directed cleanup orders.

To protect yourself against legal claims, you should photograph and document all steps taken to remove a tank. Your written records should include: 1) state and local agencies contacted, 2) date the tank was filled or removed, 3) persons or companies who did the work, 4) certified records that contamination was not found or, if it was found, detailed records of the resulting site examination.

Assessment 2.3 — Abandoned Tanks

If you have an abandoned or unused tank, evaluate your situation below. Put the number (1, 2, or 3) of your choice in the column labeled Your Risk. Refer to Section 2.3 above if you need more information.

ASSESSMENT 2.3 — Abandoned Tanks

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Tank removed or left in place?	Inactive tank removed.	Inactive tank left in place, emptied, and filled with approved material.	Inactive tank abandoned and left underground (or above ground).	
Inspected for contamination?	Tank site checked for contamination of soil and groundwater.		Tank site not checked for contamination.	

Responding to Risks

Use the Action Checklist below to record your medium and high risks. Plan and take actions to reduce your risks.

ACTION CHECKLIST

When you finish the assessment charts, go back over the questions, find all high and medium risks and write them below. For each of these risks, write down the improvements you plan to make. To help you decide what to do, use recommendations from this worksheet as well as information from other resources. Pick a target date that will keep you on schedule for making the changes. You don't have to do everything at once, but try to eliminate the most serious risks as soon as you can. Often it helps to start with inexpensive actions.

Write all high and medium risks below.	What can you do to reduce the risk?	Set a target date for action.
Sample: Gas for lawnmower stored in a glass jug.	Buy a UL-approved container from the hardware store.	One week from today.

FOR MORE INFORMATION...

Who to contact for more information about fuel management:

Underground and aboveground storage tank regulations. Contact your county or municipal construction, engineering or building department for more information on permits needed to install or remove fuel storage tanks.

Petroleum product storage, tank testing, and suppliers Contact New Jersey Department of Environmental Protection's Bureau of Field Operations at (609) 633-0708.

Petroleum product spills. Report the spill to New Jersey Department of Environmental Protection's Environmental Action Hotline at (609) 292-7172, your local health department and your local fire department.

Depth to water table. Contact your local Soil Conservation District for more information about the depth to the water table in your area.

Publications

US Environmental Protection Agency publications.

The U.S. Environmental Protection Agency is a national clearinghouse for general information. The following EPA publications are available from the National Center for Environmental Publications and Information, PO Box 42419, Cincinnati, OH, 45242-2419.

- ✔ "Guide to EPA Materials on Underground Storage Tanks" Order number EPA/510/B94/007.
- ✔ "Underground Storage Tanks: General Information Packet" Order number EPA/510/E93/001.

World Wide Web (Internet) Site

A wealth of fuel storage tank information can be found on the World Wide Web. You can find web sites on this topic by using combinations of these terms in your searches: *petroleum, storage, tanks,* and *residential*.

This Home*A*Syst assessment does not cover all potential risks related to fuel management which could affect health or environmental quality. There are other worksheets available on a variety of topics to help homeowners examine and address their most important environmental concerns.

This worksheet was co-authored by Richard Castelnuovo, staff attorney, National Farm*A*Syst office, Madison, Wisconsin, and Dean Solomon, District Extension Natural Resources Agent, Kellogg Biological Station, Michigan State University Extension.

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