HOME* A*SYST
Home Assessment System

Home*A*Syst
Home Assessment Guide

Michigan
Groundwater
Stewardship
Program

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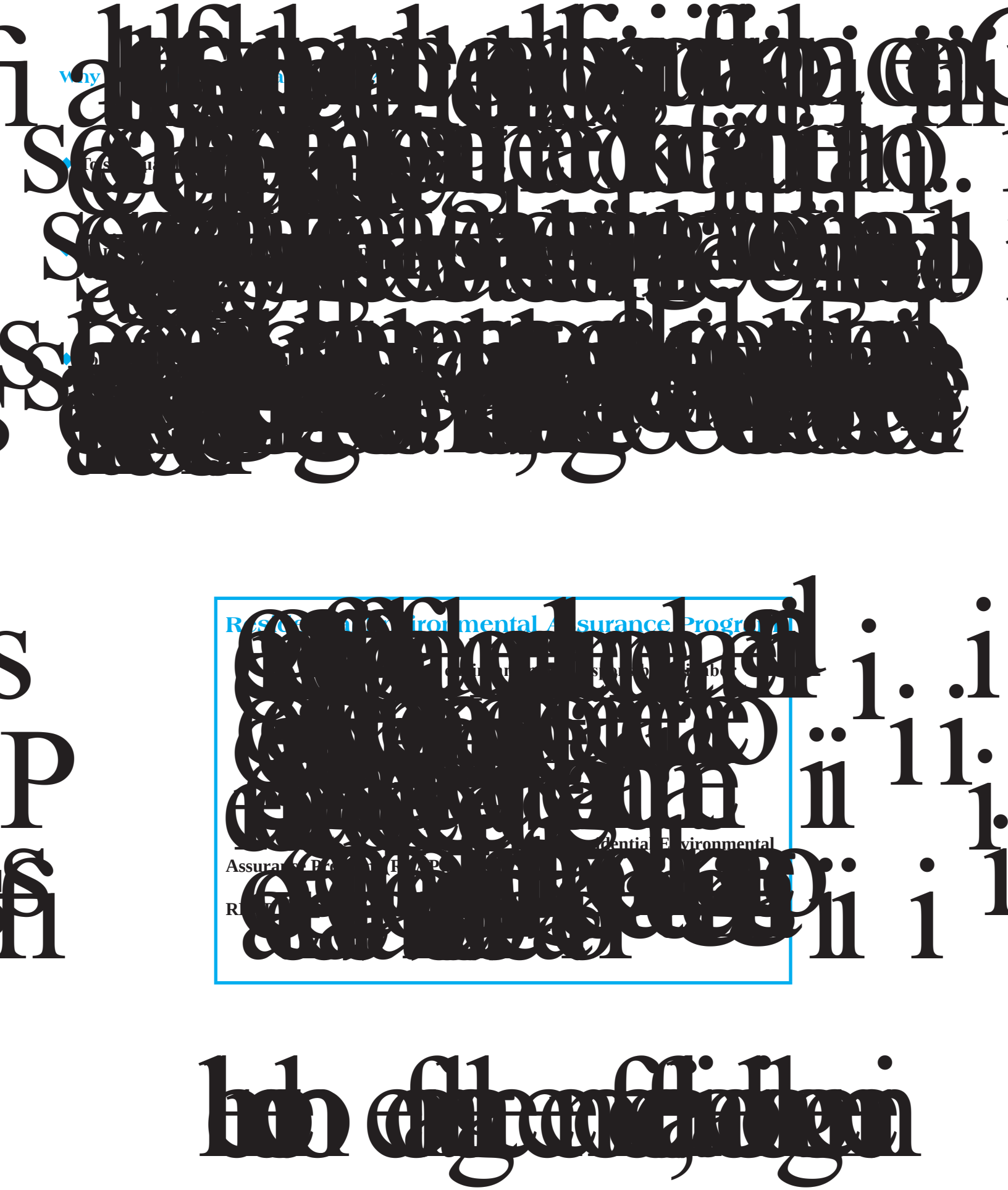

HOME* A*SYST
Home Assessment System

Chapter 1. Site Assessment: Protecting Water Quality around Your Home

This chapter will provide an aerial view of your homesite and help you to identify activities that pose risks to water resources. Completing the chapter will provide information you can use throughout the Home*A*Syst series. This site assessment covers two areas:

1. Physical characteristics of your homesite

- Soil type and depth
- Depth to bedrock
- Depth to water table
- Location of wetlands, streams or lake
- Your watershed

2. A site map of your home

You will create a map of your homestead, with buildings, roads, possible pollution sources, and other human and natural features, to help you identify potential trouble.

Why should I learn about my homesite's physical characteristics and how I manage my home?

What you do in and around your home can affect water quality both below the ground and in nearby lakes, streams, wetlands or coastal ponds. This chapter will help you identify some important physical characteristics of your homesite, such as soils, geology, depth to groundwater and nearness to surface water. It also invites you to draw a simple "aerial view" map of your homesite. Your completed map will show the locations of important features and activities in and around your home that may pose risks to your health and the environment. Remember, this assessment is a starting point. It is meant to encourage you to complete all of the other Home*A*Syst chapters that relate to your homesite.

What is a watershed?

The water from your faucet comes in nearby lakes or streams and part of a much larger watershed. No matter where you live in Michigan, you live in a watershed, but what is a watershed?

A watershed is the land area that drains to a common waterway, such as a stream, lake, estuary, wetland or groundwater. Watersheds vary greatly in size. A watershed can be as small as a few acres or as large as several square miles. Even the smallest stream has a watershed, and all watersheds are part of larger watersheds that ultimately drain to the ocean. Each watershed is the land area that drains to a common waterway, such as a stream, lake, estuary, wetland or groundwater. Watersheds vary greatly in size. A watershed can be as small as a few acres or as large as several square miles. Even the smallest stream has a watershed, and all watersheds are part of larger watersheds that ultimately drain to the ocean. Each watershed is the land area (Figure 1). It is like a bathtub. The watershed outlet – the mouth of a pond, lake or river – is the tub's drain. The watershed boundary is the tub's rim. A watershed's drainage system consists of a network of rivers, streams, man-made channels and storm drains, wetlands and the underlying groundwater. Common activities – such as how you dispose of used motor oil or fertilize your lawn and garden – can affect water quality, even when you do these things far from any shore. Paying careful attention to how you manage activities in and around your home helps protect your watershed and the water you drink. It helps protect city as well as private wells. You can surf your watershed and obtain information about local watershed organizations by going to websites given at the end of this chapter. Some areas in Michigan have existing watershed activities. Go to www.michigan.gov/deqwater and select "surface water," then "watersheds" for more information.

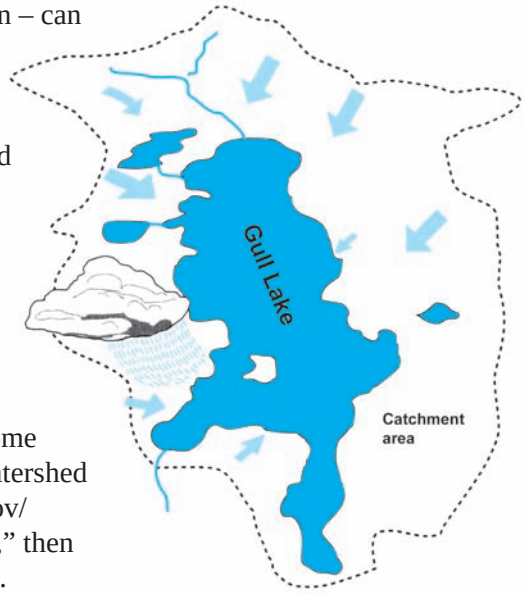

Figure 1: Watershed illustration, showing the catchment area (inside dotted lines), streams and receiving body of water.

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What influences the quality of your water?

Understanding the factors that influence water quality is important in protecting safeguarding your water supply. Physical characteristics such as soil type, depth to groundwater and nearness to surface water may speed up or delay a contaminant's effect on water quality. Activities that affect water quality include improper drinking water well construction and maintenance, pesticide/ fertilizer use and storage, unsafe septic system maintenance, garbage disposal methods and animal waste storage (Figure 2).

Name your watershed:
(For help, see "Resources" at end of chapter.)

_____

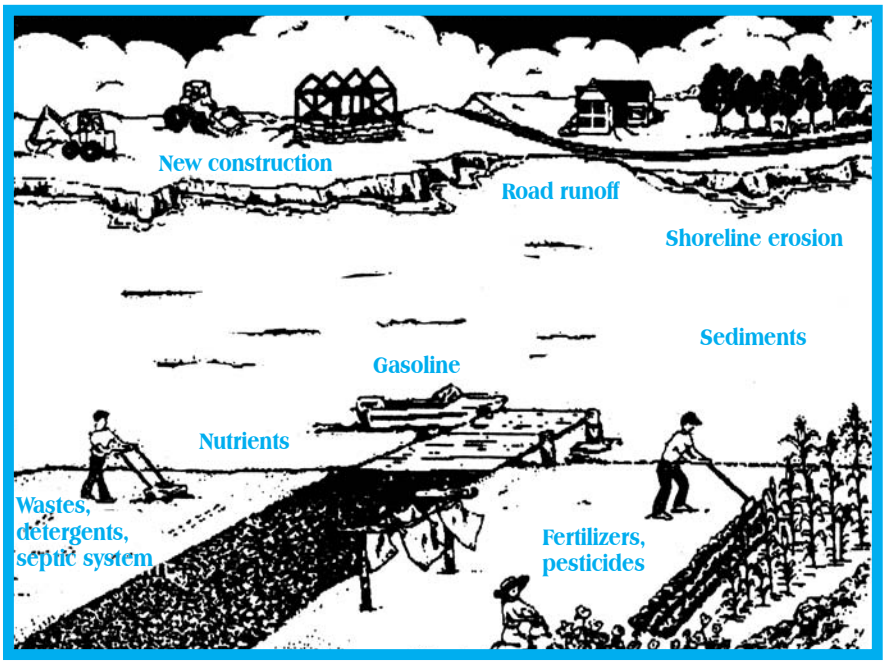


Figure 2: Some activities and physical conditions that can harm water quality.

Part 1 – Physical Characteristics of Your Homesite

Every home comes with its own set of physical conditions. The information below will help you answer the questions in the assessment at the end of Part 1.

How can soil type affect water quality?

Soil plays an important role in determining whether water and contaminants will move into groundwater. Soil properties such as texture, structure and permeability affect the movement of water and contaminants through soil. Coarse-textured soils, such as sand and gravel, allow water to move rapidly into groundwater. Contaminants dissolved in water can move through

Soil type:

_____

Soil depth:

_____

Depth to bedrock:

_____

Type of bedrock:

_____

What is your soil type?

Soil is grouped into three basic types based on particle size: clay (small particles), silt (medium particles) and sand (large particles). You can get more information about your soil type by visiting most local soil conservation offices. Is your soil clay, silt, sand or somewhere in between? Consult the soil survey manual for your county conservation district or the soil survey website (see "Resources" at the end of this chapter) to learn more about your soil. Indicate your soil characteristics to the left.

What is your soil depth?

Deep soils provide a greater buffer between the surface and groundwater. Contaminants have more time to be filtered out by deep soils before they reach groundwater than shallow soils. Generally, soils that are less than 3 feet deep represent the highest risks for groundwater contamination.

How close is your bedrock to the surface?

Bedrock is the solid rock that lies beneath the soil and subsoil layers. Bedrock can be a source of groundwater pollution as well as a barrier to pollution risks. Shale, granites and other dense types of rock make an effective barrier that blocks the downward movement of water and contaminants. Other rocks, such as limestone, can be highly permeable, allowing water to move freely. When bedrock is split or fractured, water can move through it unpredictably, spreading pollutants rapidly over long distances.

Other factors affecting groundwater vulnerability

Groundwater is found in the spaces between soil particles and in the cracks of bedrock. Contaminants are able to reach groundwater. Clay soils, which are made of tiny particles, slow the downward movement of water and in some cases can impede water movement completely. Sandy soils allow for rapid water movement, and silty soils [illegible] is a mixture of sand, silt and clay particles.

What is located around your site?

other features below the ground. Check your well drilling records (if you have them) or ask the owner who has lived there for a long time. Local well drillers, [illegible] can help you find information on your [illegible]

Geological Survey (517-241-1515), the U.S. Geological Survey (517-887-8903) or the local county conservation district.

What are the risks to your well?

Soil that can absorb surface water is a natural filter. Rainwater or irrigation may wash chemicals or even when you water your lawn. This runoff can wash contaminants from the land's surface into nearby surface waters. Runoff in cities goes to storm drains and then to surface water.

Your yard slope (the incline from the horizontal) also is important. A steep slope increases the risk for surface erosion and runoff. Combined with soil type it can make a difference in the amount of water that can be clay soil would allow more runoff than a sandy soil on a 100-foot horizontal distance).

List nearby lakes, streams and wetlands and distance to your property:

_____

_____

_____

How deep is the water table?

If you dig a hole, you will eventually reach soil saturated with water. The water table fluctuates throughout the year. It is usually highest in the spring when soil is saturated from rain and snowmelt. In summer, the water table usually is below the surface. The water table of spring and in late fall. In general, the closer the water table is to the land's surface, the easier the groundwater can be contaminated. A water table that is less than 10 feet from the surface usually presents a high risk for groundwater.

Depth to your water table:
(Check with your local health department.)

_____

How are the water above and below the water table related?

water, and eventually discharges into rivers, lakes, springs and wetlands. If you keep impurities out of surface water but do not protect groundwater – or vice versa – contaminated waters may occur where you least expect.

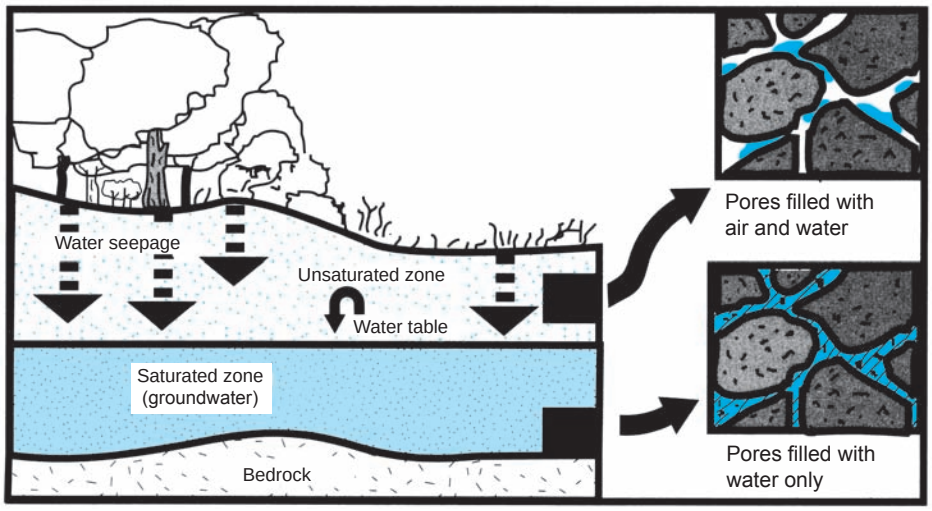


Figure 3: Groundwater, water seepage, saturated and unsaturated zones, and the water table.

✔ Assessment 1 – Homesite Characteristics: Identifying the Risks

For each characteristic (row), three choices are given that describe situations or activities that could lead to high, medium and low risks of groundwater contamination. Assessing the risk of a new well drilling or a proposed fuel drilling operation to you. Some points may not be exactly what you have, choose the one that comes closest (low, medium or high) in the column "Your risk." Refer to Part 1 above if you need more information to complete the risk assessment.

	Low risk/ recommended	Medium risk/ potential hazard	High risk/ unsafe situation	Your risk
Runoff risks to lakes, rivers, wetlands or other surface water due to soil type	Sand/gravel (large particles).	Silt/loam (midsized particles).	Clay (very tiny particles).	
Runoff risks to surface water due to slope	Yard with 0-4% slope.	4-9% slope.	Greater than 9% slope.	
Risk to groundwater due to soil type	Clay (very tiny particles).	Silt/loam (midsize particles).	Sand/gravel (large particles).	
Soil depth	Deep (over 12 feet).	Moderate depth (3 to 12 feet).	Shallow (less than 3 feet).	
Bedrock	Solid, not permeable or fractured.	Solid limestone or sandstone, or fractured granite or shale.	Fractured limestone or sandstone.	
Depth to water table	More than 20 feet.	10 to 20 feet.	Less than 10 feet.	
Nearness to surface water	More than 100 feet.	25 to 100 feet.	Less than 25 feet.	

Responding to risk

Do not be overly alarmed if your assessment identifies other risks to your water. You can take measures to reduce the risks listed above in all your activities. Although you can't change your soil type or the depth to bedrock, you can take these factors into account when locating and managing activities to reduce environmental problems. Notes related to this following map and work on other Home*A*Syst chapters.

Part 2 – Making a Map of Your Homesite

Why make a map?

Your property has some features you can change to minimize risks. Draw a map of your homesite, identifying areas where you can focus your efforts. This map will assist you in completing other Home*A*Syst assessments. And if you involve children as you make your map and conduct the assessment, you will help teach them the importance of having clean water.

The materials you need are readily available: measuring tape (optional), clipboard, pencil and the grid on the last page of this chapter. The map you create will be an aerial view – the way your property would look if you took a photo of it from the air (see Figure 4).

Potential sources of contaminants

Several management practices and home-structure situations could result in major impacts on water quality. As you survey your property to make your map, be especially watchful for the following:

- Improperly located or poorly maintained septic system.
- Underground storage tank containing fuel oil, gasoline or other petroleum products.
- Improperly constructed well or an abandoned well.
- Stockpiled animal waste close to the well.
- Improper storage, use or disposal of yard and garden chemicals.
- Machine maintenance workshop near your well.

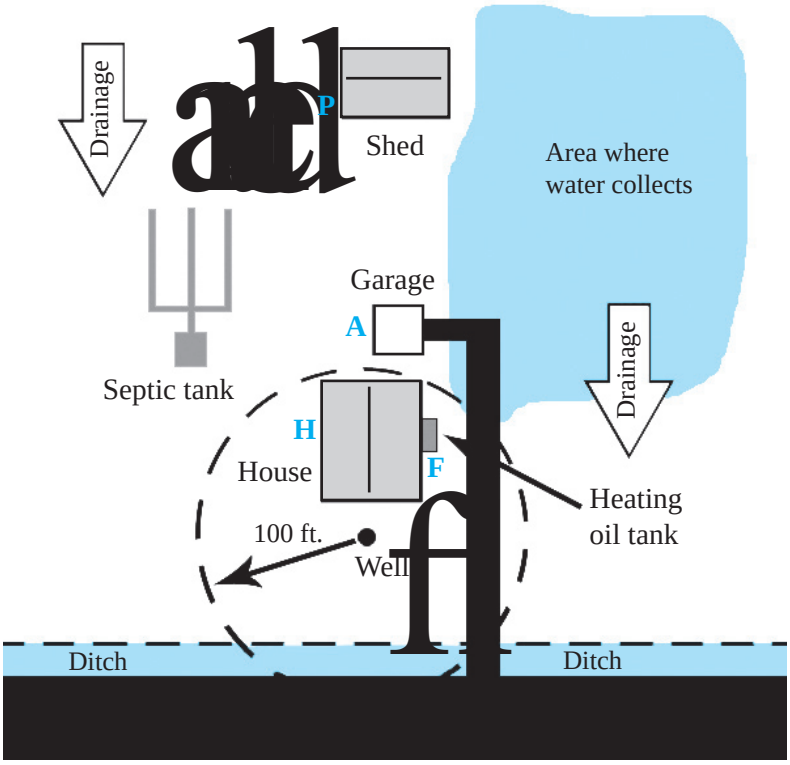


Figure 4: [illegible] direction, fuel (F), automotive products (A), pesticides (P) and hazardous products (H) storage.

Instructions: your homesite map

Homesite features to include:

Property boundaries
House and garage
Outbuildings, sheds
Animal lots, barnyards
Septic tank and leachfield
Ornamental ponds
Water wells
Heating oil storage tank
Abandoned well
Dry well
French drains
Floor drains
Vegetable garden
Lawn area
Other cultivated areas
Roads, driveways
Drainage ditches
Storm drains
Pesticide/fertilizer storage
Compost pile
Rain barrel
Rain garden
Trees
Nearest surface water (lakes and streams)
Flower beds (non-veggie gardens)

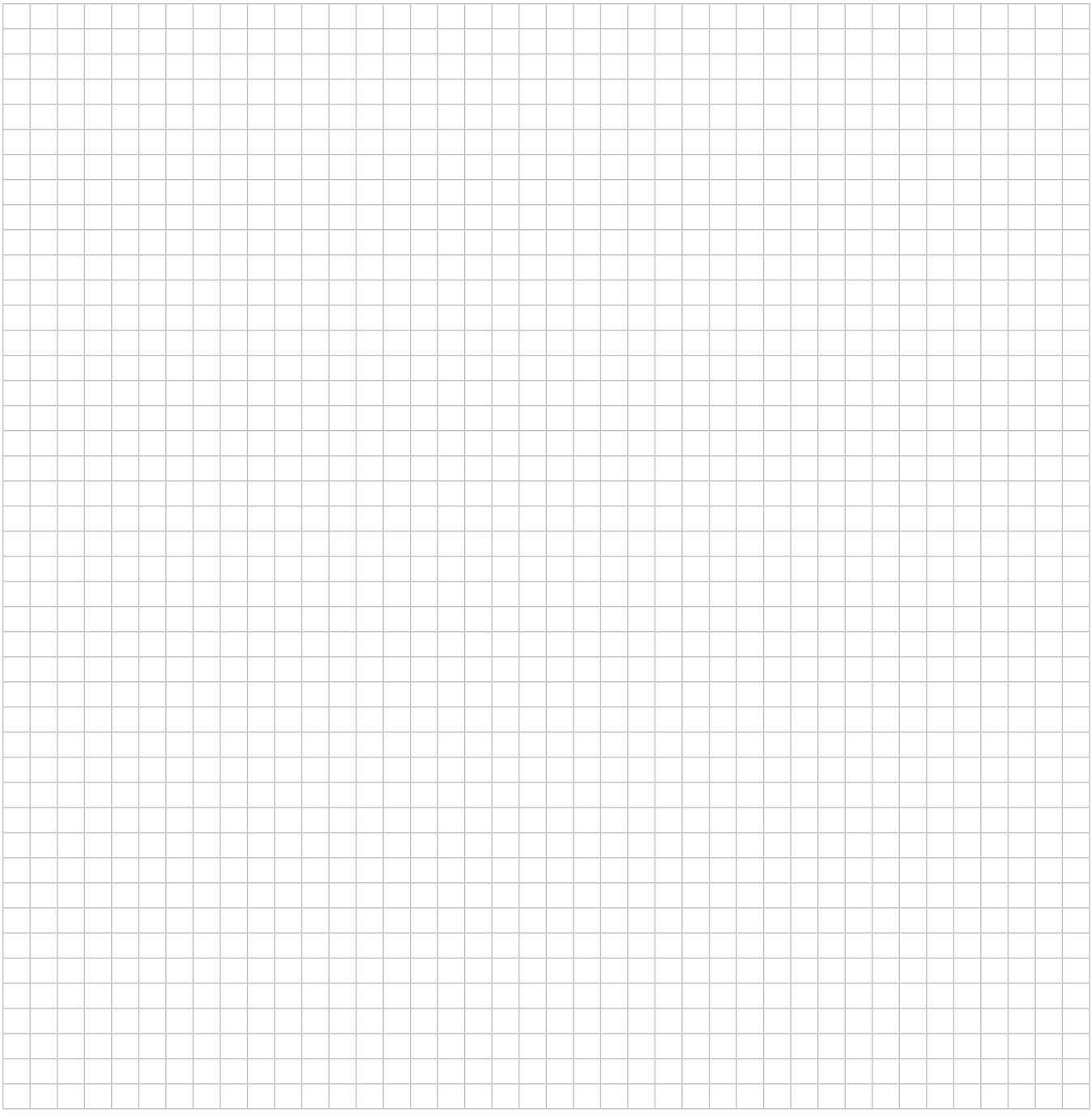
Location codes. On your map, note the areas where you store chemicals and other potential hazards by using letter codes. Make up your own code letters or symbols as needed. Examples:

F = Fuel tanks for gasoline or heating oil.
A = Automotive products such as motor oil, gasoline and antifreeze.
P = Pesticides (herbicides, insecticides, fungicides, etc.).
H = Hazardous products such as solvents.

Other map-making ideas. For large, view maps, add landscape and man-made features, such as hills, lakes, streams, roads, bridges, power lines, dumps and gas stations. Indicate seasonal changes at your homesite. For example, are there wet areas in the spring or fall? Such features might indicate a high water table.

Don't limit yourself to what you see. Underground fuel tanks are just a few possibilities. Find out if any underground fuel tanks exist on neighboring properties. If tanks, septic systems or other potential sources of contaminants exist upgradient (that is, "upstream") from your water well, they could affect the safety of your groundwater.

Putting it all together – a quick evaluation. As you assess yourself and your property, you may find problems or your property may have features that put you at risk. If you find problems in these areas, then you should be concerned. For example, you may have discovered that your heating oil tank is located in an area with a high water table or that you apply lawn or garden chemicals within 25 feet of a lake or stream. Perhaps your soil is sandy and your gasoline storage tank is close to your drinking water well. Maybe there is an old abandoned well on your property that you forgot about. Or perhaps you have a flood-prone area where you store hazardous materials. Be sure to take steps to correct these problems.



Blank graph sheet for drawing your homesite map

For Residential Environmental Assurance Program (REAP) certification:

- Complete all the blanks in the margins of this chapter regarding your soil, bedrock, distance to surface water and depth to water table.
- Complete a homesite map detailing features given on the previous page under *Instructions: your homesite map.*

Resources

Locating lakes, rivers and wetlands:
http://gwmap.rsgis.msu.edu

Select *Start the Viewer*. Place indicator at your homesite and zoom in on your part of the county. You will see lakes as blue areas and rivers as black lines. Go to *Visibility* and select *Groundwater Inventory* and then select *Wetlands*. You will see green outlined wetland areas. After this you may go back to *Visibility*, and under *Image Backdrops* click *Aerial* to view your homesite. To measure the distance from your home to the lake, river or wetland, you can use the *Measure* feature in the buttons at the top.

Soil information:
http://websoilsurvey.nrcs.usda.gov/app

Michigan water information:
http://mi.water.usgs.gov/hydrosum.php

Watershed organizations:
www.michigan.gov/deq

Enter "Michigan Watershed Organizations" into search.

Watersheds:
Surf your watershed: www.epa.gov/surf
Watershed map: www.michigan.gov

Enter "Michigan's major watersheds" into search and open map.

Watershed map and other information: www.iwr.msu.edu

For map go to "Tools & Data, Watershed mapping," then log in and select watershed site.

How Home*A*Syst can help. If you identify potentially hazardous or unsafe situations in your site assessment, Home*A*Syst's Risk Ranking Worksheet will help you rank those that relate to your home. There are more chapters in the Home*A*Syst handbook. The chapter on fuels contains information on the safe management of gasoline, heating oil, diesel and other fuels. The chapter on drinking water wells will explain how to manage your private well water supply. These chapters will help you identify problems and develop an action plan for protecting groundwater, your family's health and the local environment.

This chapter was written by Ann Lindsey, Water Quality Coordinator, and Jeff Braman, Water Quality Specialist, Michigan Department of Agriculture, and adapted for Michigan by Ruth Shaffer, Natural Resources Conservation Service, and Jim Bardenhagen and Roberta Dow, Michigan State University Extension. Updated in 2008.

HOME*A*SYST
Home Assessment System

Chapter 2. Managing Household Trash: Preventing Waste, Reusing, Recycling and Composting

There are many ways to reduce the amount of household trash you produce and many alternatives to dumping or burning your trash. This chapter looks at your household practices and how they may affect air and water quality on your property.

1. **Reducing the amount of trash you produce**
   - Shopping to reduce waste ("environ-shopping" and "precycling")
2. **Creative methods to deal with wastes**
   - Reusing
   - Recycling
   - Composting
3. **The hazards of waste disposal on your property**
   - Alternatives to on-site dumping and burning

Why should you be concerned?

As the U.S. population increases, the amount of trash produced each year also increases. Not only are there more people, but each person is producing more waste than people did in the past. Studies estimate that in 200[illegible], each person produced around 4.5 pounds of waste each day, compared with 2.7 pounds in 1960. Surveys also found that most consumers do not realize what is in their own trash. Many think they throw away more plastics—by weight—than they really do, or that glass or aluminum cans make up more of it. This shows what is really in the common household trash that we can each *year* household over a year's time?

How to Assess Your Trash

What do you [illegible] you want to get rid of—trash, garbage, solid assessment.

Trash and waste - two terms that refer to all items and materials that are no longer wanted.
Reusables - items that are reused again in different ways, for example, a peanut butter jar used for storing nails.
Recyclables - materials such as glass, metal, plastic, paper, even refrigerators, that are processed back into raw materials and made into new products.
Compostables or compost materials - organic matter (primarily yard and food wastes) that can be composted and returned to the earth as a soil conditioner.
Garbage
incinerated.

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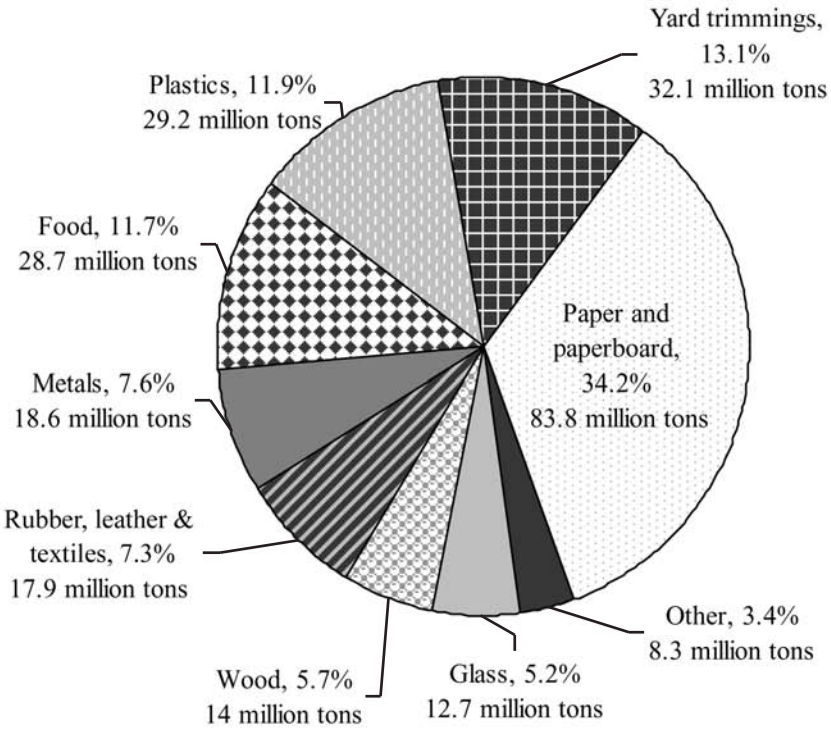


Figure 1: Annual amount of solid waste from U.S. households. *EPA, 2005.*

Trash Facts

the Department of [illegible] the end of this [illegible] has become a serious transportation, environmental and economic issue for communities [illegible] carbon emissions to landfills [illegible] less protect air and water quality and the health of people and wildlife.

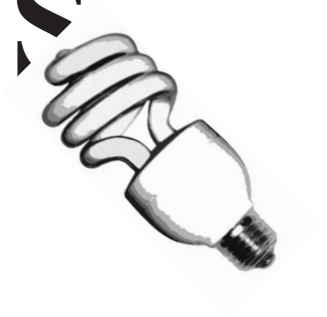


Figure 2. Energy-efficient bulbs cost more initially. Compact fluorescent bulbs, though they cost more—last 10 times longer than ordinary bulbs. In the long run, they cost much less to operate.

Part 1 - Minimizing and Preventing Waste

the assessment table to determine your waste potential, using the information below to help answer the questions.

Can you become a waste-conscious shopper?

You make purchasing decisions every day, and each purchase involves a certain amount of waste. Whether you're buying groceries, toys, furniture or appliances, your selections determine the type and volume of waste that must someday be discarded. But if you buy with the environment in mind—that is, if you use your purchasing power to minimize your impact on the environment—you will select products that produce a minimum of waste. **Precycling** and **enviro-shopping** are terms that refer to this kind of purchasing. The following questions are ones typically asked by an enviro-shopper before a purchase is made.

How much do you need?

Among other things, enviro-shopping means buying only what you need. A good price or a bulk package may tempt you to buy a larger amount of paint, food or household cleaner than you really need. But what may seem like a good deal when buying often ends up wasting money because the unused or spoiled product is eventually thrown away. Make sure you can use what you buy or know someone who can use the leftovers.

toys that are glued. Long-lasting products make good hand-me-downs, too.

your need to buy wrapping paper. In a world with increasing numbers of disposable and single-use products, it is a real challenge to avoid waste when shopping.

How much trash do you make each day?

[illegible] weight by 3 to get the daily amount. You might want to keep wet wastes in plastic zip-top bags so things don't get too messy. Then analyze your trash. How much of the material is paper? How much is recyclable? How much is hazardous? How much could have been avoided? How many pounds of trash would you produce in a *year*?

Is the product or its packaging recyclable?

Many [illegible] manufacturers use the international chasing arrows "recyclable material" symbol (see Figure 3). But be careful—the symbol only means the product is made from materials that are *suitable* for recycling *if* your local recycling program will take them. If it cannot be recycled locally, then the product package is not truly recyclable, at least not where you live. The list of materials that your local program will accept changes over time, so you will need to keep up-to-date. If you can't recycle locally, you might be able to take some of your recyclables to a neighboring community that will accept them. Much information can now be obtained online; see "Resources" at the end of this chapter.

A

Recyclable material

B

Recycled content

Figure 3: Recycling symbols.

A. Recyclable material symbol – container or package is *potentially* recyclable.

B. Recycled content symbol – container made from recycled materials.

Is the product or its packaging made from recycled materials?

A surprising variety of products are made from recycled material—everything from carpets to salad dressing bottles. Once materials are recycled, they will be made into new products or packaging only if there is a market for them. As a consumer, you can use your buying power to support and encourage markets for [illegible] This is often called "[illegible] you [illegible] about. This means that materials [illegible] down and made into new cans. On product packaging, look for the words "made from recycled materials" and especially for "made from postconsumer recycled materials." Postconsumer means that all or part of the packaging is made from materials that have been recycled by consumers in community recycling programs. Instead of words, some packaging materials (such as corrugated cardboard) use the chasing arrows symbol in solid black or in a black background (see Figure 3). This means that packages or products are made entirely or predominantly from recycled materials.

Do I buy products with the least amount of packaging?

In America, we produce more trash per person than people anywhere else in the world. About a third of the paper, plastic, glass, cardboard, and metal we throw away [illegible] provide [illegible] products [illegible] but [illegible] enviro-shopping means choosing products having the least amount of wrapping [illegible] that you know will be used [illegible] packaged products are

If your packaging selections are limited, tell the store manager what you want and write or call the product manufacturer about your community's solid waste situation and your preference for minimally packaged products.

✔ Assessment 1 – Minimizing and Preventing Waste

help you answer the questions.

	Low waste potential	Medium waste potential	High waste potential	Your waste potential
Packaging purchased	I usually select packaging that minimizes waste.	I sometimes consider packaging when selecting products.	I never consider packaging that minimizes waste.	
Ability to recycle packaging	I regularly purchase containers/packaging that can be recycled locally.	I sometimes consider whether packaging is recyclable when making purchases.	I never consider whether packaging is recyclable before buying.	
Quantities purchased	I purchase only what is needed and avoid accumulating unused products.	I sometimes buy more product than I can use.	I often purchase more product than I can use.	
Products purchased	I try to purchase items made from recycled content.	I rarely consider products made from recycled content.	I do not seek products made from recycled content.	
Product durability and potential for reuse	Products are selected on the basis of durability, ease of repair and potential for reuse.	I sometimes select products on the basis of durability, ease of repair and reuse.	I never consider durability, ease of repair or reuse.	

the assessment above. Use the ideas in Part 1 to help you become an enviro-shopper.

Part 2 – Reusing, Recycling and Composting

Once you make a decision to purchase a product, always remember there are three questions to ask:

1. Is it reusable?

amount of environmental impact. By taking canvas or net shopping bags to the store or mall, you will be avoiding bringing paper or plastic bags home. Reusable bags not only reduce waste but can be cleaned and are stronger than disposable bags.

Sharing used clothes and used furniture is a common form of reuse. If you can't share with friends, family or neighbors, try to find outlets for reuse. Here are some ideas:

Often reuse is limited only by the imagination.

2. Is it recyclable?

and taken to stores. An aluminum can makes a complete recycling circle in as little as 60 days *(Earth911.org)*. A recycling success story!

Studies have shown that more than half of all household wastes are recyclable. Remember, if you don't have curbside recycling, you will have to

in only a few areas. A growing number of communities require recycling by law. You should not limit recycling to typical grocery store-purchased materials such as aluminum cans, cardboard, glass bottles and cans. Local scrap dealers or industrial salvage yards may want certain types of plastics, wood, electronics, doors, furniture, appliances, systems furniture and

For more information, see the recycling section of www.michigan.gov/deq and

cans. We rely on them daily to communicate, conduct business and educate but what happens to this equipment when it's worn out or replaced by an updated version?

Many electronics contain hazardous materials, such as lead in solder, cadmium in circuit boards, and mercury in switches. Most older computers and televisions contain cathode ray tubes (CRTs). CRTs contain [illegible] that can cause environmental and health damage if not managed safely. Lead is a [illegible] Because of [illegible] CRTs will be disposed of [illegible] Michigan residents recycle their solid waste incinerators with the potential of leaching [illegible] lead into the [illegible]

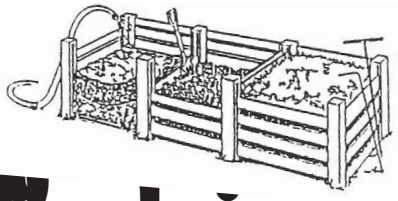
[illegible] your computer, [illegible] may not be enough to protect you from identity theft. You need to *completely* destroy the data on your hard drive. In 2006, the U.S. EPA developed two fact sheets that provide information about donating electronic equipment and a list of free software you can use to delete information from your computer. See "Do The PC Thing for Consumers" at http://www.epa.gov/epaoswer/osw/conserve/plugin/pdf/pcthing-con.pdf.

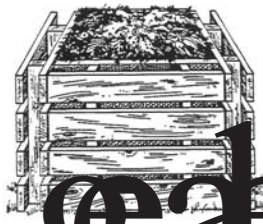
Many Michigan communities have started electronic collections programs to deal with the growing e-waste. Check with your local community or waste hauler to find if and when a collection is available. Recycling options for Michigan residents are available at www.michigan.gov/deq. Enter "electronic waste" in the search bar. [illegible] national resource for recycling information is Earth911.com. By entering your zip code, you can call [illegible] www.Earth911.org.

3. Can it be composted?

Yard and food wastes typically make up over 30 percent of the waste stream. The amount of yard and food wastes that your home generates depends on your eating and gardening habits, size of yard and region. Since 1995, Michigan households [illegible] composting programs with convenient drop-off sites or curbside pickup.

Composting is a natural process that, with the help of microbes, earthworms and fungi, turns kitchen and yard wastes into a high quality soil amendment. Many [illegible] grass [illegible]





compost bins [illegible] information on

✔ Assessment 2 – Reusing, Recycling and Composting

[illegible] of compost bins.

help you answer the questions.

	Low waste potential	Medium waste potential	High waste potential	Your waste potential
Reuse	I reuse as many household wastes as possible.	I reuse when convenient.	I never reuse or recycle.	
Waste recycling	I always recycle all materials that centers accept.	I recycle materials when convenient.	I occasionally or never recycle materials.	
Composting	All yard wastes and kitchen [illegible] composted at [illegible]	Some yard or kitchen wastes composted.	I never compost.	
A box [illegible]				

Reviewing Your Waste Potential

[illegible] help you plan changes.

Part 3 – The Trouble with On-site Trash Disposal

Disposing of household trash by burning or dumping on private property is widely practiced but can pose threats to your health and the environment. Although many rural areas have used these disposal methods for decades, local and state laws are becoming more restrictive. At the end of this section, complete the table to determine your risks, and consider alternatives to on-site disposal methods.

Do you burn your trash?

Smoke from burning trash may contain:

- Arsenic
- Benzene and other pollutants
- Cadmium
- Chromium
- Formaldehyde
- Hydrochloric acid
- Lead
- Polycyclic aromatic hydrocarbons
- Sulfuric acid

these—such as lead or mercury—can be hazardous to breathe. Eventually, most byproducts from burning are removed from the air by rain or snow and are deposited on land or water. Because of concerns about such releases of hazardous air pollutants, most states and localities have passed laws to restrict what you can burn. In some areas, especially urban and suburban settings, open burning has been banned.

information about open burning can be found on the DEQ website at www.michigan.gov/deq. Enter "open burning" in the search bar.

Do you dump household trash on your land?

when you want to sell your property. Prospective buyers may require you to clean it up as part of the purchase offer.

Are you storing hazardous household products?

By [illegible] which ones are hazardous and how to dispose of them according to their label instructions. For more information on dealing with hazardous wastes, see Chapter 3, "Managing Hazardous Household Products."

directly into lakes and streams. Storm sewers, remember, are rarely connected to wastewater treatment plants. Litter has formed plastic islands in the ocean, and the plastic debris, after years of exposure to the sun, turns into small pieces of plastic that can be eaten by birds and fish, injuring them. Another wildlife problem is caused by discarding tires that provide a haven for mosquitoes. Find your local household hazardous waste, recycling or composting program on the Internet or in the telephone directory. If you do not have Internet access, contact your local government officials or call the Michigan Department of Environmental Quality.

What about pharmaceuticals in my trash?

Unused medicines can be a threat to the environment when they are thrown in the trash or flushed down the toilet. Pharmaceuticals have been found in groundwater and surface water and are a growing concern nationally and internationally. They should not be burned in the trash or disposed of on-site.

The following steps will help you dispose of unwanted medicines:

- Check your local household hazardous waste collection or recycling program to see if they accept pharmaceuticals. Some communities have a special collection day for unwanted medicines. Others have a permanent collection site for household hazardous waste.
- Contact your local household hazardous waste collection or recycling program coordinators to see if anything is available in your area. A list of contacts is at www.deq.state.mi.us/documents/deq-ess-p2-recycle-countycontacts.pdf
- If a collection program is not immediately available, follow the handling suggestions in the drug disposal section of the drug label/insert.

✔ Assessment 3 – Waste Disposal in Your Property

appropriate risk level (low, medium or high) in the column labeled "Your risk." Refer to the information above in Part 3 to help you respond.

Responding to risks

Your goal is to reduce your risks. On the following Action Checklist, write your high and medium risks. Use the ideas in Part 3 to help plan actions you can take.

	Low risk/ recommended	Medium risk/ potential hazard	High risk/ unsafe situation	Your risk
Burning trash	No household trash is burned on site.	Paper and cardboard are burned. Burning done in approved container and guidelines followed.	Burning conducted. Burning guidelines ignored.	
On-site dumping	Only organic wastes (leaves, grass clippings, food, wood chips, etc.)		Household trash and liquids, appliances, tires and other junk are discarded on site. Hazardous and other wastes are improperly discarded	
A box				

✔ Check your risks.

down the improvements you plan to make. Use recommendations from this chapter and other resources to decide on actions you are likely to complete. A target date will help you stay on track. You don't have to do everything at once, but try to minimize the most serious problems as soon as you can. Often it

Write all high and medium risks here.	What can you do to reduce the risk?	Target date for action:
Example: Products purchased without considering if packaging is recyclable.	Find out about town recycling programs and try to buy products whose packaging can be recycled locally.	One week from today: May 15

Resources

Recycl[illegible]
Contac[illegible] for s[illegible] recycle, how to identify it and how to prepare it for recycling. Ask for information on composting and other disposal alternatives.

List of local recycling programs:
Use clickable map at www.mi[illegible]

If no local recycling [illegible]

Electronic waste:
For information about industry-sponsored electronics recycling or disposal (computers, televisions, cell phones, etc.), contact the manufacturer. Many national electronics manufacturers and major retailers have sponsored collections and offer low- or no-cost recycling programs. Information can be found [illegible] their corporate websites or asking about [illegible] your electronic products. You may also

For more information about electronics recycling in Michigan:
www.michigan.gov/deq – Enter "electronic reuse and recycling" in the search bar.

Prescription [illegible]

[illegible]

Books

The green consumer supermarket guide. 1991. Makower, J. Penguin Books, New York, N.Y. ISBN: 0-140147756

[illegible] Tips and Techniques. 2001. Rathje, W., and C. Murphy.

This Home*A*Syst chapter does not cover all potential issues or risks related to solid waste management that could affect health or environmental quality. It is meant to serve as a starting point for identifying and addressing the most [illegible] most important environmental concerns.

[illegible]

Kathleen Parrott, Virginia Polytechnic Institute and State University [illegible] was adapted [illegible]

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Chapter 3. Managing Hazardous Household Products

Some products may be harmful to your health and the environment when they're used improperly. This chapter will help you recognize and reduce your risks. It covers safe use of products from purchase to disposal.

This chapter is divided into three parts:

1. Purchase and use
- Product choice
- Amount purchased
- Safe use

2. Safe storage
- Child safety
- Containers and spill prevention
- Ventilation

3. Disposal
- What to do with leftovers

Why should I be concerned?

Some products used around the home can pose threats to your health or the environment if not used properly. Vapors from paint thinner and other solvents can be harmful to breathe. If dumped on the ground, products such as motor oil or pesticides may end up contaminating your drinking water or a nearby stream.

This chapter will help you make choices that will reduce risks to your family, your drinking water and the environment. It is up to you to use, reuse or dispose of these products safely. For each chemical or product, there are many questions to think about:

- Which product best meets my needs?
- Is there a less harmful product?
- What is the best way to store it?
- How can I use it safely?
- What should I do with leftovers?
- [illegible] safe [illegible] around children?
- [illegible]

[illegible] of [illegible] the home. Even products that contain hazardous [illegible] good to know the difference between hazards to health and hazards to the environment.

Household products that could be hazardous, if poorly managed:

Household cleaners—ammonia, bleach, oven cleaner, drain opener, toilet cleaner.
Building supplies—treated [illegible] wood preservatives.
Automobile products—[illegible] solvents, lead-acid batteries, gasoline, mercury switches.
Home maintenance products—oil-based paints, mineral spirits, paint thinner, paint stripper, products that can remove tough grease or [illegible]
Hobby and [illegible]—[illegible] paints, [illegible]
Pesticides—weed killers, rat and mouse [illegible] fungicides, mothballs.
Personal products—[illegible] remover, spray leather protector.

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Human health hazards

Chemicals contained in some of the products in your home can cause health problems, *especially if the user does not observe product label warnings.* Health effects can range from minor problems, such as [illegible] to major problems, such as poisoning. [illegible]

chemicals depends on:

- The type of chemical [illegible]
- [illegible]
- Your weight, age and state of health.

Some harmful effects appear right away, such as **poisoning** [illegible] symptoms are nausea, as damage to lungs or kidneys, take a long time to occur **(chronic poisoning).**

E [illegible]

can last for hours and [illegible] be [illegible] systems are built up, it could harm normal body functions.

Some cleanup or dumping practices may not seem likely to lead to trouble, but old habits should be looked at for possible risks. Remember:

- ✔ Don't dump oils, paints or pesticides on roads or down storm sewers.
- ✔ Don't dump anything in a wetland or stream.
- ✔ Don't dump used motor oil or antifreeze on the ground, down a storm drain or into any surface water.
- ✔ [illegible]
- ✔ [illegible] ds.
- ✔ [illegible]
- ✔ [illegible]

Part 1 – Product Choice, Purchase and Use

Your choice of products is important. By carefully choosing the right amount of the right product for the job, you can control the amount of hazard you bring to your home. These facts will help you decide your risks from products you use.

How can you [illegible]

[illegible] you [illegible]

environmental harm as well as human health problems. In all cases, they signal that one should read the label and use care with these products. Some terms on labels, however, may be misleading. Companies can promote their products as "ozone safe" or "environmentally friendly," but there is no common agreement about what these terms mean.

safety questions.

In case of emergency

Don't rely *only* on the label for information. **Poison Control**—a national computer data network—can give **emergency** health advice about a product.

1-800-222-1222

Keep this number close to your phone.

For repeated information about a hazardous product, contact the

the safest for you.

You may have some recipes for household cleaning products using common ingredients instead of

- ✔ directions. Be sure to rinse between products used on the plate.
- ✔ Always test any cleaner on a small area before using it on the whole job.
- ✔ Do not
- ✔ should be clearly written on the label. Make sure containers do not look like food or beverage containers.

Do you buy only what you need?

If you buy more than you need, hazardous products may build up and create storage and/or disposal problems. Product containers may become damaged and leak. Some products are not useful after long storage. Some products, such as pesticides, may have been restricted or banned since they were bought. If [illegible] Avoid [illegible] to use it, [illegible] or Clean

✔ Assessment 1 – Product Choice, Purchase [illegible]

	Low risk/ recommended	Medium risk/ potential hazard	High risk/ unsafe situation	Your risk
Product choice	I always read labels and choose the least hazardous product that will do the job.	I sometimes read labels and occasionally avoid hazardous products.	I never read labels and purchase products regardless of hazards.	
Amount purchased	I buy what I need. I use up most of the products after purchase.	I sometimes buy products more than a year.	I buy more than I need.	
Safe use	I follow label instructions and recommended precautions against [illegible] ventilation, face masks,	I follow some label instructions.	I never follow label instructions, even when recommended.	

Responding to risks

Your [illegible] environment [illegible] your risks.

Be prepared—make a spill kit!

A spill kit is a very handy item to keep around the house should chemicals leak or spill. A spill kit contains materials necessary for cleaning up a variety of dry or wet spills.

- Plastic storage tote – Holds materials in one location.
- Safety goggles – Protect eyes, one of the most sensitive areas on the human body.
- Chemical-resistant gloves – Nitrile gloves are suitable for most household chemicals; work gloves or gloves with linings do not provide adequate protection.
- Broom and dustpan – To sweep up spills.
- Shovel – For easy handling of leaky or spilled material.
- Cat litter or sawdust – To soak up liquid spills before sweeping and disposing.
- Emergency telephone numbers – To seek help if needed.

Part 2 – Safe Storage

Le[illegible] pe[illegible] ar[illegible] to[illegible]

When you store hazardous products, do you:

- ✔ Keep them out of reach of children and pets?
- ✔ Store them in a locked, secure area?
- ✔ Store them in their original containers?
- ✔ Make sure all containers are clearly labeled and dated?
- ✔ Keep containers tightly sealed and dry?
- ✔ Sto[illegible] fro[illegible]
- ✔ St[illegible] ver[illegible] ?
- ✔ [illegible]
- ✔ Have a spill kit?

Are your storage locations and containers really safe?

If you [illegible] a household [illegible] being stored, the lid may be loose or [illegible] make sure that containers are closed tightly, they are not leaking and sides are not bulging.

T[illegible]

Figure 1: Hazardous products can be found throughout the home. *Image by Karla Embleton and Amy Childress, Purdue University.*

	Low risk/ recommended	Medium risk/ potential hazard	High risk/ [illegible] situation	Your risk
Child safety	Hazardous products stored in a locked cabinet or other location inaccessible to children/pets.	Haz[illegible] out [illegible] but s[illegible]	[illegible]	
Safe storage	Leftovers stored in original containers and properly sealed. Products sorted by type. Environment protected from spi[illegible] su[illegible] as sec[illegible] co[illegible] or pr[illegible] [illegible] or	sto[illegible] in a disorganized way. No protection against leaks or spills. Products protected from overheating or freezing.	Leftovers kept in non-original containers such as used milk jugs or glass jars. Stored unlabeled without caps or lids. No protection for leaks and spills. Products not protected from overheating or freezing.	
Ventilation	so[illegible] a[illegible] pe[illegible] places with good ventilation.	[illegible] attention to storage [illegible]oc[illegible]ion, but each [illegible] in good shape [illegible] tightly sealed.	Products stored in basements, closets, craw[illegible] spaces or other areas wi[illegible] poor ventilation. Containers in bad shape or left open.	
Spill kit	[illegible] conv[illegible] [illegible] [illegible] [illegible]	[illegible] k[illegible] [illegible] but [illegible]	N[illegible] spill kit available.	

A box [illegible]

Re[illegible]

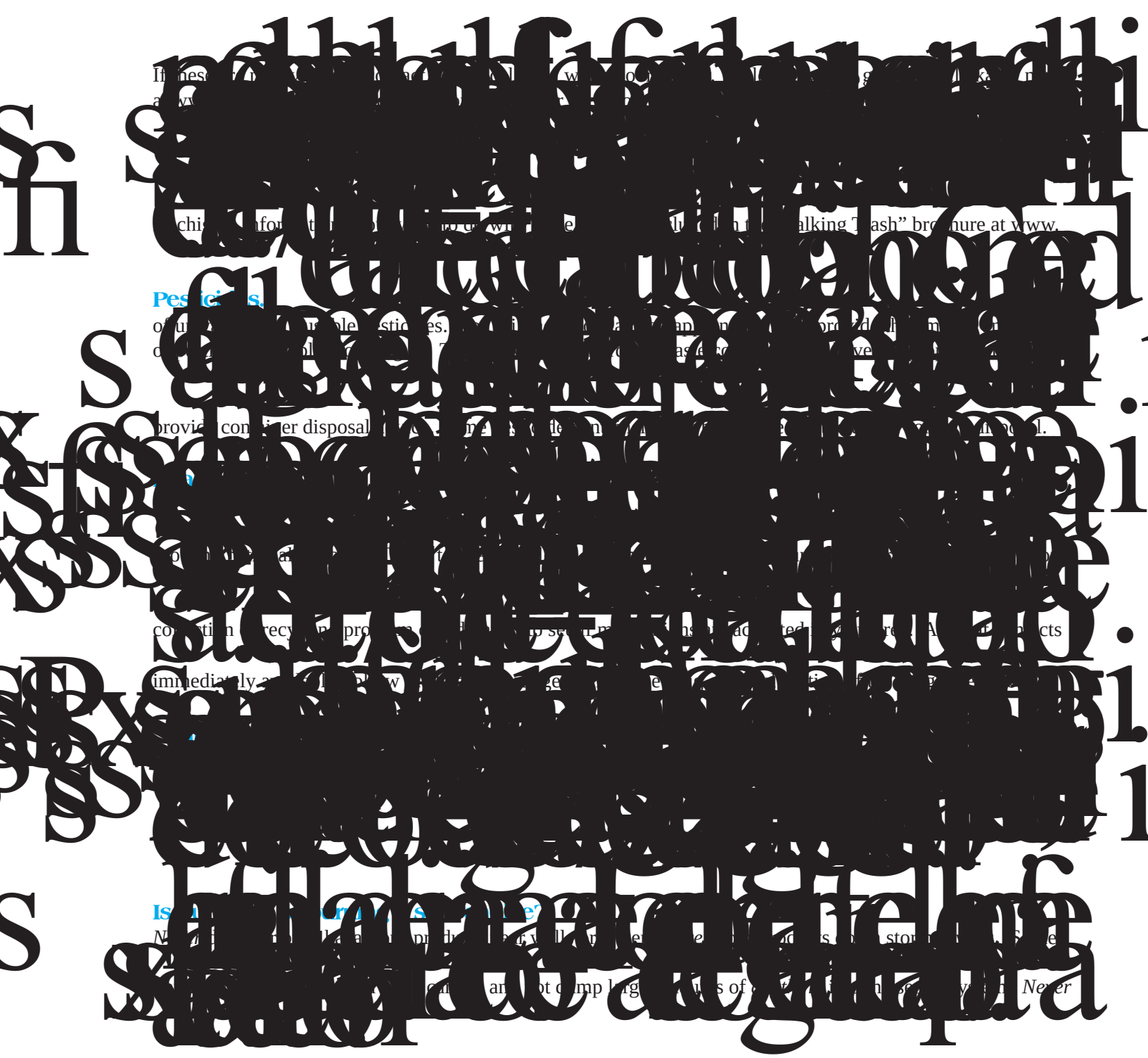
Yo[illegible] to [illegible] yo[illegible] [illegible] and [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] help you reduce your risks.

Pa[illegible]

Wh[illegible]

Yo[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [

✔ Assessment 3 – Product Disposal



Waste group (refer to Chart 1)	Low risk/ recommended	Medium risk/ potential hazard	High risk/ unsafe situation	Your risk
Household trash Trash containing plastics or empty containers of hazardous ingredients.	I use up hazardous ingredients. I recycle or dispose of hazardous containers according to the label. No burning is done.	I burn hazardous containers. I dispose of hazardous containers by burying them on my property but away from my well or any water.	I burn hazardous containers near my well or water. I dispose of leftover pesticides and chemicals on my land or near a well or water.	
Strong acids and bases (corrosive) Found in hobby products, cleaners and repair products.	I use strong acids and cleaners safely.	I pour strong acids and cleaners down a drain connected to a septic system without adding water.	I pour strong acids and cleaners into storm sewers, creeks or streams, or in a ditch leading to water.	
Batteries Mercury, cadmium and lead.	I recycle batteries or take them to a hazardous waste disposal program	I dump batteries in my garbage.	I dump batteries and chemicals in the same spot, near a well, water or stream.	
Hazardous products	I share, recycle or take leftovers to a hazardous waste disposal program. I follow the label for safe disposal.	I dispose of leftover products at a licensed	I don't follow the label. I dispose of leftover products in the same place, near a well or water, or dump leftovers in a stream.	
Pesticides "Restricted" or "Toxic"	I handle all types of pesticides as directed on the label. I take unused pesticides to a Clean Sweep site.		I do *not* handle pesticides as directed on the label. I don't bother to properly dispose of unusable pesticides. I go to Clean Sweep.	
Pharmaceuticals	I contact my local household hazardous waste coordinator about how to dispose of unused medications. I flush medications down the drain or toilet.	I make sure unwanted medications are safe by removing them from their containers, mixing with liquid soap and removing personal information from the bottle label, then wrap in bags and put in trash.	I flush medications down the drain or toilet.	
Sharps Hypodermic needles, lancets.	I use a community take-back program for used sharps. I store them in a clearly labeled, safely stored container, and seal it	I collect used sharps in a clearly labeled, puncture-proof container. When it is full, I seal the container and put it in the trash.	I throw sharps in the trash.	

A box

Chart 1: Hazardous Product Examples

Household trash

- ash/ sludge from home or garbage trash burn barrel
- used motor oil
- unrinsed pesticide or chemical containers
- [illegible]

Clothing and fabric care products

- [illegible]
- sho[illegible]s
- pol[illegible]sh remover
- hair sprays

Hobby and recreation products

- [illegible]
- chemistry set
- photography and swimming pool chemicals

Household cleaners

- bleach
- ammonia
- oven cleaner
- drain opener
- toilet bowl cleaner

Medical

- unwanted medications
- used sharps

Pes[illegible]

- [illegible]

Automobile products

- antifreeze, motor oil, grease
- gasoline
- solvents for oil and grease removal
- engine, parts cleaners: transmission, carburetor, brake quieter
- paints and paint preparation products
- lead-acid battery
- battery terminal cleaner
- tire cleaners
- rust removers
- ignition wire dryer
- gasket remover
- aerosol paint and primer products
- [illegible]

Home improvement/ repair products

- [illegible]
- products
- paint stripper

Building and equipment maintenance products

- strong acids and bases
- lead-based pai[illegible]
- oil/alkyd paints
- [illegible]
- roof coatings and sealants
- rust removers
- silicon lubricants
- other lubricants
- adhesives, glues and caulk
- wood-preservative products
- brush or spray gun cleaners
- wood and cement water repellents
- solvents for degreasers and paint thinners, stains, varnishes

Action Plan

risk[illegible] reac[illegible] you[illegible]

Pick a [illegible] to k[illegible] yo[illegible] [illegible] ges. You don't have to do [illegible] at one [illegible] t to ch[illegible] [illegible] ks as soon as you can.

List the high and medium risks	What can you do to reduce the risk?	Target date for action
Example: Cabinet with cleaning solvents and paint stripper is not childproof.	Buy a lock and install on cabinet.	One week from today: November 28

Resources

Hazardous products – Contact the manufacturer.

[illegible] th[illegible] [illegible] ich [illegible] [illegible] f Ag[illegible]

Publications

"Citizen's Guide to Pesticides." [illegible]

"Protect Your Home." [illegible]

Further Information

The Ecology Center
117 [illegible] St.

Email: info@ecocenter.org

[illegible]

Contact this organization for publications, groundwater

www.purdue.edu/envirosoft/housewaste/house/house.htm

[illegible]

Enter "Clean Sweep" in search bar, click "MDEQ - Clean Sweep" then click "Clean [illegible]

Email: kbradof@mtu.edu
Contact for general information on hazardous household products.

www.wmeac.org
Center for sustainable living, sustainable agriculture and water quality research.

materials related to this subject.

This [illegible] chapters on various topics help homeowners look at their most important environmental concerns.

[illegible]

Michigan by Ann Cros[illegible] and Jim Carder, [illegible]

HOME*A*SYST
Home Assessment System

Chapter 4. Lead in and around the Home: Identifying and Managing its Sources

This chapter addresses sources of lead in and around the home and explains the health hazards associated with exposure to lead. Completing the assessments will help you identify and evaluate lead-related risks to your family's health. This chapter is divided into four parts:

1. **Identifying lead sources inside the home**
   - Lead-based paint in or on pre-1978 homes
   - Lead in drinking water from contact with lead pipes, lead-based solder or other plumbing sources
2. **Identifying lead sources outside the home**
   - Leaded exterior paint
   - Automobile exhaust
   - Industry
3. **Health effects of lead on children**
   - Avenues of exposure
   - Effects and symptoms of poisonings
4. **Living safely with lead**
   - Cleaning existing lead contamination in the home
   - Containing lead sources to prevent poisoning

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Why should you be concerned?

Lead poisoning is a serious but preventable health problem. Many public health experts consider it the No. 1 children's environmental health problem in the United States. Many homes have one or more sources of lead. According to [illegible] children under 6 years old have blood lead levels [illegible]. The chief suspect is lead-based paint dust in older homes. Families can also be exposed to lead from other sources.

Lead is a soft metal that has been used in ammunition, ceramics, printer's ink, children's toys, solder, paint, coins, leaded crystal, water pipes and gasoline, and for many other purposes. Lead is dangerous because it is so widely used and lasts for hundreds of years in the environment. It never breaks down into a harmless substance. You can take steps to reduce your exposure to lead, but you cannot completely avoid it. Reducing exposure is especially important for children.

Depending on the level, lead can have wide-ranging effects in humans. Even very low lead levels in children can slow or stop mental development and cause learning and behavioral problems. Lead can also cause high blood pressure. Higher levels may cause damage to the nervous system and the reproductive system. Sadly, the effects of lead poisoning are often not reversible.

Where are the lead sources in and around the home?

The most common sources of lead are deteriorating lead-based paint, household dust (which can contain lead dust from deteriorating lead-based paint or remodeling), soils contaminated by leaded paint or leaded gasoline exhaust, and drinking water delivered through lead pipes or in contact with lead solder or some brass faucets. Over the years, lead has been eliminated by law in residential paint, gasoline, solder and water pipes. However, many older homes contain lead paint, and even newer homes can contain lead from other sources. Unlike many chemicals, lead does not break down and can remain for long periods in paints, dusts and soil.

✔ Part 1 – Identifying Lead Sources Inside the Home

Identifying and controlling sources of lead in and around your home is an important responsibility. To determine potential risks from sources inside your home, complete the assessment at the end of this section. The information below will help you answer the assessment questions.

When was your home built?

According to the U.S. Department of Housing and Urban Development, 74 percent of all homes built before 1980 contain potentially dangerous levels of lead paint. Although lead has been banned from house paint since 1978, the majority of U.S. homes were built before then. Homes built before 1950 are very likely to have high lead levels, especially in paint used on windows and exterior surfaces. Levels as high as 25 to 35 percent lead by weight are common. Some pre-1950 paint was 50 percent lead.

Does your interior paint contain lead? What is its condition?

Lead-based paint is the most common source of lead exposure for children. Most exposure, however, comes from contact with contaminated household dust rather than eating paint chips. As paint ages or as painted surfaces rub against each other, lead-containing dust is created. If paint is peeling, chipping, or chalking, the presence of lead paint is a greater risk. Even if paint is not deteriorating, lead exposure is much higher in homes with lead paint.

Testing for Lead

The only way to know for sure if paint contains lead is to have it tested. A professional inspection usually includes a risk assessment. The inspection will look for how much lead is in interior and exterior paint. The assessment will determine the lead danger from any lead-based paint found. Testing can be done by a certified lead professional using a laboratory for examination or on-site with a portable device. Paint samples, which are used to test dust for lead contamination, may be taken by lead professionals and sent to a lab for analysis. Some laboratories may analyze surface wipe samples collected by the homeowner. Do-it-yourself home test kits are available in stores. These indicate the presence or absence of lead but do not measure the amount of lead present. Home test kits may be helpful for testing small areas, but your results may not be accurate. Using a

If you find lead...

service providers can be found at the LeadSafe website, or by calling the Department of Community Health Lead Program toll-free at 1-866-691-5323. Paint removal, replacement of lead-painted parts (such as windows, door jambs and moldings), liquid encapsulants (special paint-like products that cover a surface) and removal of leaded surfaces are some of the options for dealing with lead paint. Lead-based paint removal by untrained workers who do not use the proper methods and equipment can create a much greater health hazard than just leaving the paint alone.

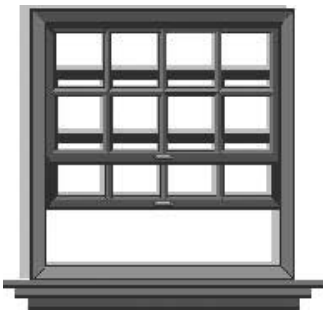

Figure 1 High friction areas such as inside window frames and sashes often have lead dust from weathering paint.

Is there lead paint on windows and door frames? What is their condition?

Paints with higher lead levels were used where exposure to moisture was greatest: windows, doors and exterior walls. If high lead-based paint is intact, it poses little risk. If it is chipping or chalking off or is scraped or sanded during repairs, then the risk of exposure is great. Lead dust, most dangerous to kids and pets, is likely to come from weathering (chalking) paint and especially from surfaces that bang or slide together, such as doors and windows (Figure 1).

Safety note

If you're planning to do any remodeling yourself, you should become knowledgeable about lead paint. Contact the National Lead Information Center (NLIC) at 1-800-424-LEAD. Many communities offer "Lead Safe Work Practices," an 8-hour training program through the U.S. Department of Housing and Urban Development and the U.S. Environmental Protection Agency (EPA). Local governments enforce lead repair and hazard [illegible] what remodeling wastes they accept and if they have special requirements for lead-contaminated waste from the home.

How else can lead enter the home?

In consumer products—Lead is present in such products as lead-crystal glassware and leaded wine bottle neck wraps made before 1990. It may also be in some foreign-made products such as toys, miniblinds, chalk, crayons, ceramics and food cans (which may be made with lead solder). Although lead is no longer used in printing inks, it may be present in food packaging, labels and newspaper print.

From the workplace—Workers in occupations such as construction, auto repair, battery manufacturing, and furniture refinishing may bring lead dust home on their work clothes, shoes, and skin. Workers exposed to leaded dust should shower and change clothes before entering their homes.

In hobbies—Stained glass, pottery, and making fishing sinkers are hobbies that may involve lead. Lead solder and bullets and lead sinkers also come in contact with lead. Exposure can also

In ethnic medicinals or cosmetics—Various Hispanic and Asian communities utilize mixtures that contain high levels of lead. Some stomach preparations are quite toxic.

Is your drinking water lead-free?

Although your drinking water is not usually a concentrated lead source like paint or soil, it can still pose risks. Many homes have lead pipes that bring water to the home. Lead-containing solder is used to join copper pipes. Brass and lead-containing chrome faucets can contribute lead to drinking water. Water tends to dissolve lead more readily when it is soft or acidic. Hot water dissolves lead more easily than cold water. Lead particles in dust and soil can enter water supplies. Even bottled water and water from some water coolers may contain lead. Boiling water does not remove lead. In fact, boiling water for cooking will increase the lead concentration if lead has leached into your drinking water if lead is present in your water system.

What can you do to minimize lead in your water?

Water [illegible] "aggressive" [illegible] parts per billion [illegible] the lead level of 15 ppb. If your water [illegible] using it for drinking or cooking.

Figure 2: Using bottled water for drinking and cooking is one option for dealing with lead-contaminated water.

Also, always use cold tap water for cooking and drinking; hot water is more likely to release lead if present in the plumbing system. Never use water with high lead levels (over 15 ppb) to mix infant formula. For severe lead contamination, you may need to install a water treatment device, such as a

Buying bottled water for drinking and cooking may be the easiest and least expensive option for dealing with severe lead contamination (Figure 2). Be aware, however, that bottled water is not necessarily lead-free. Water treated by distillation or reverse osmosis is usually best. Call or write to the company and request a copy of its most recent water test results.

✔ Assessment 1 – Identifying Lead Sources Inside the Home

Use this assessment to rate your lead-related indoor health risks. For each question, circle the level (low, medium, high) and write in your own risk. Outdoor sources may not pose a risk to you. Visit a lead professional for help completing the assessment.

	Low risk/ recommended	Medium risk/ potential hazard	High risk/ unsafe situation	Your risk
Age of home	Built after 1978.	Built between 1950 and 1978.	Built before 1950.	
Interior paint	No lead-based paint.	Lead-based paint present but intact. Friction and impact areas tested negative for lead.	Deteriorating lead-based paint: it is chipping, peeling or chalking, or recent remodeling has disturbed the paint.	
Windows and doors	No lead-based paint. Windows and doors with lead-based paint have been replaced.	Lead-based paint present but intact. Friction and impact areas tested negative for lead.	Deteriorating lead-based paint: it is chipping, peeling or chalking, or recent remodeling has disturbed the paint.	
Water supply	No lead water pipes, leaded solder or plumbing.	Lead present in plumbing, but water has been tested and precautions have been taken.	Lead likely to be present in plumbing, but water has not been tested and no precautions have been taken.	
Water acidity or corrosiveness	Hardness near 80 [illegible] per liter pH [illegible] 6.5	Hardness is 60-80 [illegible]	Hardness is less. pH less [illegible]	

A boxed risk level

Responding to Your Risks

You [illegible] risks. Turn to the Action Checklist at the end of this chapter to help you reduce your risks.

Part 2 – Identifying Lead Sources Outside the Home

Is your yard a lead hazard?

lead exposure, and levels tend to be highest where house walls meet the ground (Figure 3). Lead-contaminated soil is a problem when children play outdoors, soil is tracked indoors, or bare soil is disturbed by gardening or the drip line.

responsible for high levels of lead in soil, with levels highest near major roadways. The shift to unleaded gasoline has reduced this risk, but after years of contamination, lead levels can still be high in the soil.

If you live near industrial sources such as incinerators, lead smelters and battery recyclers, you should be concerned about lead in your soil. Urban residents should consider having their soil tested before planting a vegetable garden.

Figure 3: Chipped paint can cause lead contamination of the soil.

What can soil tests reveal?

Testing your soil for lead is relatively inexpensive. Your county extension office can provide information about soil testing and may offer soil testing for lead. Contact your local health department for information about soil testing in your area.

If high lead levels are found, there are several steps you can take. Planting grass or covering soil with mulch can keep your family from tracking the soil indoors. In some cases, removal and replacement of heavily contaminated topsoil may be recommended.

What level is safe?

Lead exists naturally in soils. It is recommended that children and pregnant women avoid soils with lead levels above 300 parts per million (ppm). If you're planting a garden in soils with levels above 300 ppm, information is available for gardening practices (see additional resources at the end of this chapter).

Lead levels in soil near busy roadways are typically 30 to 2,000 ppm higher than natural levels. Soils adjacent to houses with leaded exterior paint are likely to have higher lead levels. Levels near industrial sources can be dangerously high, especially in downwind areas. Old orchards may also have high lead levels due to lead-containing pesticides applied in the 1940s and 1950s.

✔ Assessment 2 – Identifying Lead Sources Outside the Home

Use the following assessment to rate your health risks due to lead outdoors. For each question, circle the low, medium or high risk level in the right-hand column that most closely matches your situation. You may not find a perfect match for your situation. Refer to Part 2 if you need help completing the assessment.

	Low risk/ recommended	Medium risk/ potential hazard	High risk/ unsafe situation	Your risk
Lead-based paint on exterior of house	No lead-based paint, or it is present but intact. No bare soil around all sides of the house.	Lead-based paint is weathered or chalking. There is bare soil in the sole area.	Lead-based paint is chipping, peeling or flaking. Bare soil is present below painted walls.	
Major roadways	No major roadway nearby.		Major roadway within 85 feet.	
Lead-related industry	No lead-related industry or incinerators in the area.	Lead-related industry previously in area.	Lead smelter, battery manufacturer or recycler, or other lead-related industry nearby.	
Lead in soil	Soil tested to detect lead. Shoes taken off upon entering house and [illegible]	No soil test conducted. Shoes taken off upon entering house and [illegible]	No soil test conducted. No precautions taken to ensure lead-contaminated soil is tracked [illegible]	

A boxed risk level

Responding to Risks

Your risk level [illegible] reduce your risks.

Part 3 – Health Effects of Lead on Children

Have children who live in or frequently visit your home been tested for lead?

Children 6 years old and younger are much more likely to be affected by lead than adults. They are more likely to ingest lead paint, dust and soil because they naturally engage in hand-to-mouth activities. Children are also at greatest risk from lead because their bodies are developing, and they absorb up to 50 percent of the lead they ingest. Adults absorb only about 10 percent.

Most children with lead poisoning do not show visible symptoms, but all have some degree of damage to the brain and nervous system. A blood test is the only way to detect the problem (Figure 4). At higher levels of poisoning, symptoms may include tiredness, a short attention span, restlessness, poor appetite, constipation, headache, sudden behavior change, vomiting and hearing loss. Many of these symptoms may be mistaken for other illnesses.

children and are of medical concern.

Figure 4: A blood test is the only way to detect lead poisoning in children.

✔ Assessment 3 – Health Effects of Lead in Children

Use this assessment to rate your children's health risks due to lead. Indicate the risk level in the right-hand column. Refer to the information above if you need help completing the assessment.

	Low risk/ recommended	Medium risk/ potential hazard	High risk/ unsafe situation	Your risk
If home built before 1978	Children under 6 years. living in or frequently at the home have lead		Children under 6 years of age in or often at the home not tested.	
Blood test results in children				

A boxed risk level

Recording your risk

You will use these answers to complete the checklist at the end of this chapter to record the medium

Part 4 – Living Safely With Lead

What are some ways you can reduce your family's risk of exposure?

particulate air (HEPA) vacuum, which can in some cases be obtained from your local health department. Please note a regular cleaning vacuum does not remove enough lead dust.

catches up to 99 percent of the dust and dirt sucked into the vacuum. The HEPA vacuum should meet American National Standards Institute (ANSI) Z9.2 standards and Occupational Safety and Health Administration (OSHA) and Environmental Protection Agency (EPA) regulations.

Check the vacuum owner's manual before using, and do not open or change the bag. Empty any contents inside your home.

Inside the home

Follow this step by lightly misting with a soap solution. If a HEPA vacuum is not available, carefully remove dirt and paint chips with a wet disposable towel, put it in a plastic bag and put it in the trash. Replace towels until the surface is clean. Wipe surfaces clean by applying pressure. This has been proven to be effective in removing lead dust. Misting with the soap solution and then wiping with towels is a key step. During this cleaning process, you should also keep windows closed until the cause of the dust hazard is removed. If windows must be opened, restrict children from touching [illegible] Community Health lead website (see "Resources" at the end of this chapter). Encapsulant paint can be used but only on friction-less surfaces.

When working in storage areas, make note of places used to prepare or eat food. If lead painted shelving or cabinets are used for food, cooking or eating utensils, linen or clothing, remove and clean these items and store in a safe area until the hazardous lead area has been treated. Replace, repaint and line all surfaces with vinyl, plastic or a similar covering. Adjust doors, [illegible] item such as a door, make sure to have this

Figure 5: If possible, replace lead-containing items with new. Remember to use lead-safe work practices.

solution. Start at the back of the room and work toward the exit door. You will want to change towels often until no paint chips or dirt can be seen. Place them in a garbage bag, and seal with a tape or a knot. The bag can be put out for normal trash pickup.

Outside the home

When working on the outside of the home, put a tarp down to catch paint chips, wet painted surfaces to be scraped, remove loose paint on siding, [illegible] company. The next best thing would be to repaint.

If swings, sandboxes or other children's objects are in the contamination [illegible] to the original ground height using non-leaded soil, then seed or sod the site.

✔ Assessment 4 – Safe Cleaning and Care Practices

Use the following assessment to rate your cleaning and management practices inside and outside the home. Indicate the risk level in the right-hand column. Refer to the information in part 4 if you need help completing the assessment.

	Low risk/ recommended	Medium risk/ potential hazard	High risk/ unsafe situation	Your risk
Vacuum used for lead-safe cleaning	Use a HEPA vacuum for cleaning.		Use a regular vacuum for cleaning.	
Window areas	All surfaces wet wiped; paint chips removed and window areas repainted.	Paint chips removed; windows kept closed.	Paint chips left on window area; window kept open.	
Door areas	Friction and impact points eliminated; felt liners installed; door wetted, scraped and re-painted.	Paint chips removed safely.	Paint on door is chipping and not removed.	
Storage areas (shelving, cabinets, closets)	Items [illegible] food are stored in lead-free area; [illegible] eliminated; surfaces repainted and relined with a vinyl or plastic covering.	Items used for food are stored in non-leaded area; surfaces not repainted and relined.	Items used for food remain in lead-contaminated area; surfaces not repainted or relined.	
Disposal techniques	Cleaning towels changed often; all cleaning items placed in sealed garbage bag and put out in trash.		Towels reused or cleaning items left in open trash.	
Outside siding, trim and fixture areas of the home	Loose paint removed; deteriorated items removed and replaced.	Paint chips removed; deteriorated items re-painted or sealed off with vinyl or plastic coverings.	Loose paint chips remain.	
Soil outside of home	Children's play equipment moved onto area with ground cover; bare soil roto-tilled and reseeded or sodded.	Children's play equipment moved onto area with ground cover; bare soil remains.	Bare, lead-contaminated soil in play area.	

Responding to Risks

You [illegible] your risks. [illegible] reduce your risks.

✔ Action Checklist

Complete your risk assessment and log remedies and low risks. Then list the improvements you plan to make. Use recommendations from this chapter and other resources to decide on actions you are likely to complete. A target date will help you remember. You may have to revise the timing once, but try to eliminate the most dangerous problems as soon as you can. Often it helps to

Write all high and medium risks here.	What can you do to reduce the risk?	Target date for action:
Example: House was built in 1935. Paint has not been tested for lead.	Arrange for lead risk assessment of the paint. Test for lead dust.	One week from today: April 3

Resources

Blood tests

Contact your family physician, pediatrician or public health clinics.

Testing of paint samples and drinking water

Contact your local health unit, environmental office and/or laboratories

toll-free 1-866-691-5323.

Educational information for children and others

state and locality, call the center toll-free at 1-800-LEAD-FYI. For personal assistance on a lead-related question, call 1-800-424-LEAD.

Poison Control Centers

DeVos Region Poison Control Center, Grand Rapids, Mich. Call toll-free at 1-800-222-122

Other

Publications

"Don't Spread Lead: A do-it-yourselfer's guide to **and home improvement."**
Spread Lead" into search bar.

"Get the Lead Out: Preventing Childhood Lead Poisoning Through Partnership." At www.HealthyHomesCoalition.org

"Lead in Your Drinking Water. ... Reduce Lead in Drinking Water."

"Lead ... Renovation ... Rule." ... from the ... 24-...

"Reducing ... and ... When Remodeling Your Home." 1997. EPA 7... Environmental Protection Agency.

"Soil Lead Levels." University of ... chusetts, Amherst, Department of Plant and Soil Sciences ... Plant Tissue Testing Laboratory.

This Home*A*Syst chapter covers a variety of topics to help homeowners examine and address their most important environmental concerns. See the ... for ... comments ... Home*A*Syst ... Michigan Groundwater Stewardship Program (MGSP) at 517-241-2154.

This chapter was written by Karen Filchak, Extension educator, University of Connecticut Cooperative Extension, Brooklyn, Conn. Revised with permission from the author and adapted for Michigan in 2008.

HOME* A*SYST
Home Assessment System

Chapter 5. Indoor Air Quality:
Reducing Health Risks and Improving the Air You Breathe

[illegible] to eliminate them. Health hazards related to air quality can be serious, but there are many opportunities for action. This chapter covers:

1. **Identifying and controlling potential sources of air quality problems**
   - Combustion byproducts
   - Building materials
   - Biological contaminants
   - Household products and chemicals
   - Radon
   - Methane
2. **Ventilating indoor air**
   - Ventilation
   - Air cleaning

[illegible] than outdoor air. If your home has poor air quality it may be simply annoying or unpleasant, or it may lead to serious health problems.

[illegible] paint vapors and see smoke, many harmful pollutants, such as deadly carbon monoxide gas, are invisible and odorless. Common health problems, such as irritated eyes and nose, headaches, dizziness, tiredness, asthma, viral infections and respiratory diseases, may be due to substances in the air you breathe. Some serious effects of poor air quality, such as lung cancer, may take many years to develop. People react differently to contaminants depending on their age, sensitivity and health status, and the type and length of exposure.

Part 1 – Identifying and Controlling Potential Sources of Air Quality Problems

[illegible] home. Poor air quality is usually not the result of a single pollutant. Reducing health risks to you and your family may require several actions.

[illegible] space, for example. This chapter cannot cover all possible pollutants and their sources, but it calls attention to the most common types and provides a starting point for investigation and action.

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Part 1a – Combustion byproducts: what precautions are you taking?

Fu

monoxide, nitrogen and sulfur oxi s, formaldehyde and tiny breathable particles. These byproducts should be vented to the outside to prevent accumulation indoors. Never use unvented space heaters, gas stoves or other combustion equ ment in an clos d oom. Also, ne r idle a car in the garage, even i e door to t outsi e s open. Fume an build up qu ck m te i

of ed s gas f

S ot

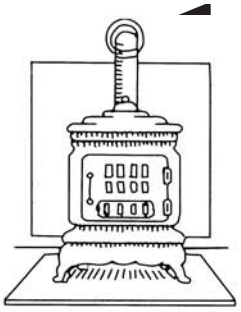
char

light r than r and readily s perses. It' impor to place the lete or ae t

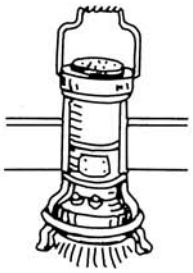
for proper use and m ai anc of fuel-burning appli

Tob

causing ch micals. A smoky h me environment puts everyone at risk, not just the smoker.

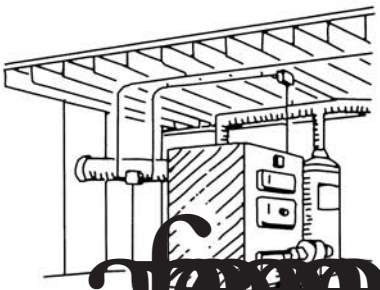


Wood or coal stove



Portable kerosene heater

Gas range



burning appliances and d vices hat may be present in a ho e

✔ [illegible]

[illegible] choices may not correspond to your situation.

	Low risk/ recommended	Me[illegible] po[illegible]	High risk/ unsafe situation	Your risk
Combustion appliances, venting	All combustion appliances are vented directly to the outside.	ker[illegible]	Kerosene or gas space heaters are frequently used in closed rooms. Not all combustion [illegible]	
Maintenance of combustion appliances, chimneys and flues	[illegible] and other combustion appliances are inspected and cleaned at least once a year.	[illegible] and other combustion [illegible] inspected [illegible]	[illegible] combustion devices are [illegible], or the [illegible] record is	
Carbon monoxide detectors (only in homes with combustion appliances)	mo[illegible] [illegible] battery	[illegible]	[illegible]bon monoxide [illegible]ector is not installed.	
Tobacco smoking	Tobacco smoking is not permitted in the home.	[illegible]	[illegible]quent smoking [illegible]es smoky indoor	

A boxed risk level

[illegible]

information in this chapter to help you make plans to reduce your risks.

Part 1b – Which building materials, wood finishes and home furnishings might be affecting your indoor air?

INDOOR AIR QUALITY CONSUMER INFORMATION

IMPORTANT HEALTH INFORMATION:
SOME PEOPLE EXPERIENCE ALLERGIC OR FLU-LIKE SYMPTOMS, HEADACHES OR RESPIRATORY PROBLEMS WHICH THEY ASSOCIATE WITH INSTALLATION, CLEANING, OR REMOVAL OF CARPET OR OTHER INTERIOR RENOVATION MATERIALS. IF THESE OR OTHER SYMPTOMS OCCUR, NOTE YOUR PHYSICIAN OF THE SYMPTOMS AND ALL MATERIALS INVOLVED.

SENSITIVE MATERIALS
PERSONS WHO ARE ALLERGY-PRONE OR SENSITIVE TO ODORS OR CHEMICALS SHOULD AVOID THE AREA OR LEAVE THE PREMISES WHEN THESE MATERIALS ARE BEING INSTALLED OR REMOVED.

NOTE:
YOU CAN REDUCE YOUR EXPOSURE TO MOST CHEMICAL EMISSIONS WHEN CARPET AND OTHER INTERIOR RENOVATING MATERIALS ARE INSTALLED, CLEANED, OR REMOVED BY INCREASING THE AMOUNT OF FRESH AIR VENTILATION FOR AT LEAST 72 HOURS. (See Installation and Maintenance Guidelines or ask for Owner's Manual.)

FOR MORE INDOOR AIR [illegible]

INSTALLATION GUIDELINES:
- VACUUM OLD CARPET BEFORE REMOVAL
- VACUUM FLOOR AFTER CARPET AND PAD HAVE BEEN REMOVED
- ALWAYS VENTILATE WITH FRESH AIR (OPEN DOORS AND/OR WINDOWS, USE EXHAUST FANS, ETC.) DURING ALL PHASES OF INSTALLATION AND FOR AT LEAST 72 HOURS THEREAFTER.
- IF ADHESIVE AND/OR PAD ARE USED, REQUEST THOSE WHICH HAVE LOW CHEMICAL EMISSIONS
- FOLLOW THE DETAILED INSTALLATION GUIDELINES FROM MANUFACTURER OR FROM CARPET AND RUG INSTITUTE

The manufacturer of this carpet participates in a program which seeks to develop ways to reduce emissions by testing samples of carpet. With fresh air ventilation, most carpet emissions are substantially reduced within 48-72 hours after installation.

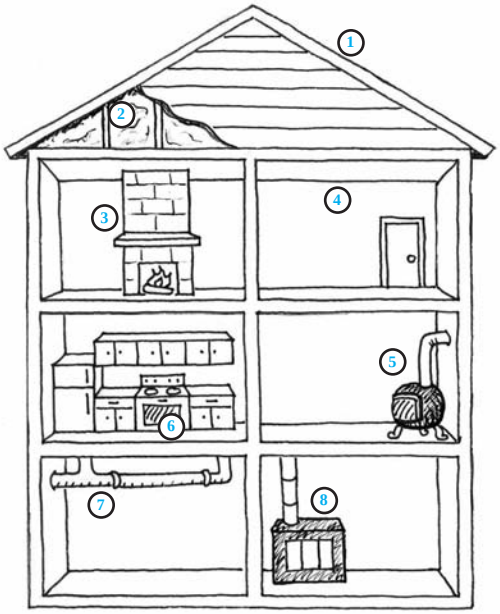
CRI GREEN LABEL PLUS

[illegible]

biological pollutants in the air.

Carpets of any age can act as a trap or sponge for chemical and biological pollutants that are carried in the air or tracked in from outside. A damp, dirty carpet is a breeding ground for biological pollutants. Carpets require regular vacuuming and cleaning.

Around the Home," for more info



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3. Fir
5. Wo
7. Pi

Figure 3: Examples of possible asbestos hazards in the home.

consultant" in the searc

✔ [illegible]

indicate your level of risk in the right-hand column. Although some choices may not correspond exactly to your

	Low risk / recommended	Medium risk / potential hazard	High risk / unsatisfactory situation	Your risk
New building materials, paints, varnishes and furnishings	[illegible] items are given adequate ventilation or period.	[illegible] building materials, paints and varnishes are given increased [illegible]	[illegible] emission products, and ventilation is inadequate.	
Carpet	[illegible] and aired [illegible] and during installation [illegible] vacuumed [illegible] cleaned immediately.	[illegible] is [illegible] carpet is [illegible] and rapid spill cleanup	[illegible] is poorly maintained.	
Asbestos (in homes built before the 1980s)	Asbestos is present [illegible] sealed encased [illegible]	Asbestos is [illegible] and intact [illegible]	Asbestos-containing material is in poor shape and [illegible]	

A boxed risk level

Respond [illegible]

Check [illegible] which [illegible] information above to help you make plans to reduce your risks.

Part 1c - Biological contaminants: [illegible]

Biological contaminants come from living or once-living organisms. They include animal hair, dander, [illegible] and feces; molds; dust mites; insect residues; pollen; and microscopic organisms. These can cause odors, damage household materials, lead to allergic reactions, and cause infectious diseases and respiratory problems. Sensitivity to these contaminants varies from person to person.

Tips for [illegible] in the home

- ✔ [illegible] base[illegible]ents or the drip pans of refrigerators and air [illegible]
- ✔ Fix [illegible] immediately.
- ✔ [illegible] hou[illegible]
- ✔ [illegible]
- ✔ [illegible]
- ✔ [illegible]
- ✔ [illegible]
- ✔ Avoid [illegible] dioxiders.
- ✔ [illegible]
- ✔ [illegible]

Figure 4: Dust mite, a microscopic animal related to spiders and ticks. *U.S. National Library of Medicine - National Institutes of Health*

indicate your [illegible] column. Although some choices may not correspond exactly to your

	Low risk/ recommended	Medium risk/ potential hazard	High risk/ unsafe	Your risk
Dust control	House is cleaned regularly. [illegible] are kept in the home.	Furry pets live in the home, but the house is cleaned regularly.	accumulate in living and sleeping areas. House is mostly carpeted and carpet is [illegible]	
Moisture control	There is no evidence of condensation in high-moisture areas or seasonally. Excess moisture is vented to the outside.	There is evidence of condensation in high-moisture areas or seasonally. Fans are sometimes used	[illegible]	
A boxed risk level				

[illegible]

Part 1d – Household chemical products, pesticides, radon and methane

Household chemical products, pesticides, radon and methane

Figure 1d-1. Examples of hazardous household products.

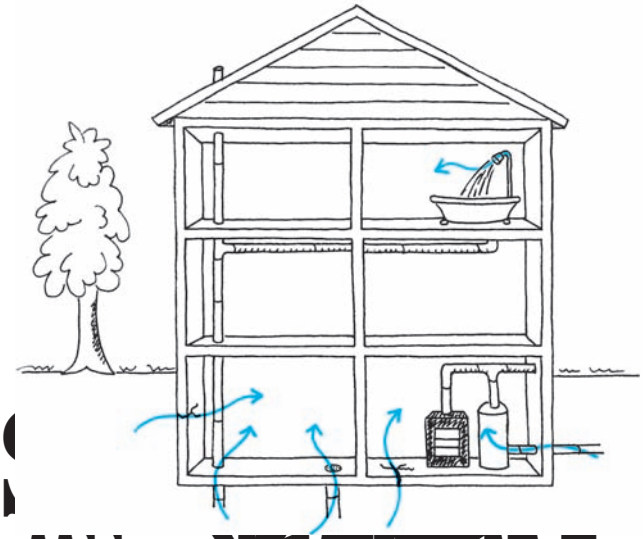
Pesticides

Radon

Methane

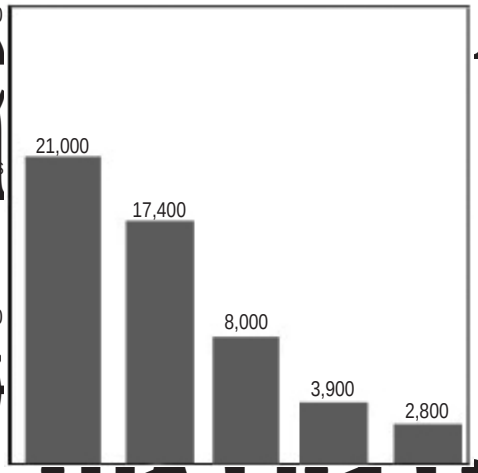
foundation.

the source and correct it. If the odor is strong, evacuate the building until the problem is corrected and the gas is removed.



Radon: is it present in your home?

Smokers are especially at risk if radon is present.



helping you reduce radon in your home.

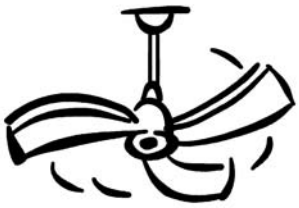
other causes are

for Disease Control and Prevention and National Safety Council Reports.

	Low risk/ recommended	Medium risk/ potential hazard	High risk/ unsafe situation	Your risk
Household products and chemicals	and safety precautions. Hazardous	of exposure occur.	period of exposure occur	
Methane			history of	
Radon		Radon is present at		

A boxed risk level

information above to help you make plans to reduce your risks.



to move air in the home.

to attract charged airborne particles, ion generators are used to give particles a charge that makes them stick to surfaces in the home. Solid sorbent cleaners—such as activated carbon or charcoal—can capture gaseous pollutants.

N

a

on several things:

- ✔ T
- ✔
- ✔ The kinds of airborne particles in your air.
- ✔ Where the unit is located in relation to the pollutant sources.
- ✔ Regular maintenance of the system.

✔ A

e

s

	Low risk/ recommended	Medium risk/ potential hazard	High	Your risk
Air freshness	Indoor air usually smells clean, in all seasons. E ra ve ded as	Air sometimes has an od or mustiness, especi lly during cert f	s	
Ventilation	ventilated. Exhaust fans are used in the kitchen and bathroom.	some uncontrol d ventilation.	H	fans are used.

P

recomm da ons above to help you make p ns to educe your risks.

✔ Action Checklist

Write all high and medium risks here.	What can you do to reduce the risk?	Target date for action:
Example: House not tested for radon.	Call health department to see if they sell tests. Conduct test.	One week from today: September 1

Resources

A Brief Guide to Mold, Moisture, and Your Home

Asbestos -

Carbon Monoxide -

Pesticides

National Pesticide Telecommunication Center

Radon

Radon Reduction Methods

Radon Testing

Radon Publications

Consumer Product Safety Commission

Publications

Publications

Publications

HOME*A*SYST
Home Assessment System

Chapter 6. Energy Savings for your Home

This chapter helps you identify possible problems with your [illegible] systems (heating, cooling, lighting, and roof), as well as the surrounding landscape. By keeping your home systems and surrounding environment in proper order, you can avoid unhealthy situations, reduce energy bills, increase your comfort level and prevent structural damage. This chapter covers:

1. **Energy efficiency**
   - Heating/cooling
   - Air-sealing and insulation
   - Domestic hot water, lighting systems and appliances
2. **Landscaping for energy conservation**

Why should you be concerned?

Your home should be a safe, comfortable place that is affordable and durable. How a home is constructed, insulated and heated/cooled directly affects how [illegible] Before extensively air-sealing your home, it is critical to ensure that doing so [illegible] issues. [illegible] A home can [illegible] be a healthy place to live.

Energy consumption

The [illegible] depends on many factors, including the weather and climate, the landscaping surrounding your home and your lifestyle.

Does your house use too much energy?

Figure 1 shows how energy is used in a typical home. Your family's lifestyle will affect how energy is consumed in your home.

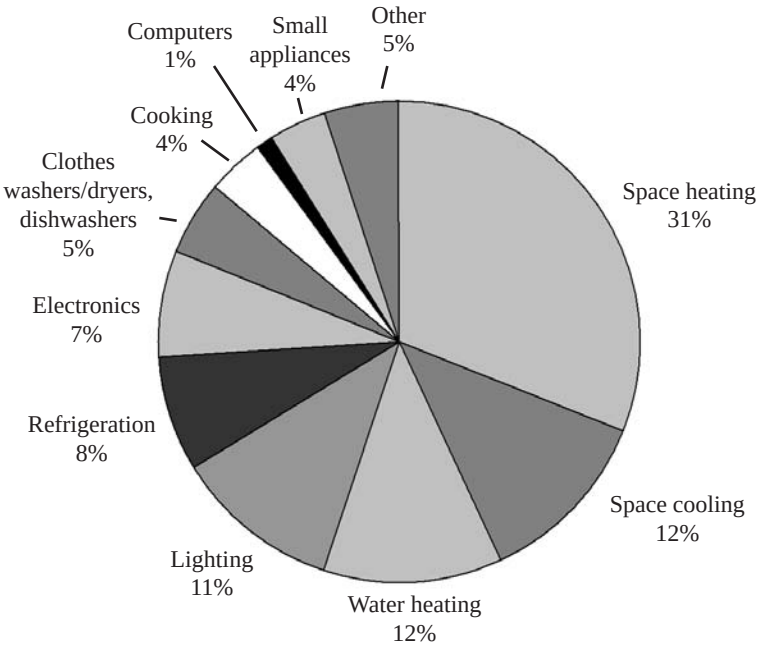


Figure 1: Residential energy consumption. *Building Energy Data Books, 2007.*

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home is to have a home energy audit performed by a service professional. Not only will the audit pinpoint high energy areas, but it will also suggest methods for cutting your energy costs. If you are unable to have a professional audit, consider doing [illegible] "Resource [illegible] make economic sense for your situation.

[illegible] appliances and [illegible] as well insulated, individual homeowners and the national economy could [illegible] you decide why where energy is being lost and which improvements are the most cost-effective improvements can be made.

Part 1a – Improving heating and cooling systems

The single greatest energy consumer in your home is the heating/cooling system (furnace, boiler, heat pump, wood stove and air conditioner—see Figure 1). This system has three parts: heating/cooling unit(s), such as furnaces and air conditioners; ducts or other distribution mechanisms; and a thermostat to control output. You can save energy in all three areas.

[illegible] eg[illegible] of the monthly energy [illegible]

[illegible] and [illegible] a regular basis. [illegible] changing air

Are you using your thermostat to save energy?

One of the easiest ways to save energy is to set thermostats at a lower temperature in the winter and a higher temperature in the summer so that the heating/cooling system runs less often. If a house is caulked and weather-stripped to prevent cold drafts, most people – when dressed appropriately –

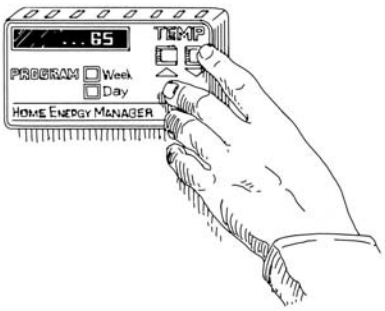


Figure 2: Digital or clock thermostats (programmable) can be set to adjust the temperature automatically.

will be comfortable at 68 degrees Fahrenheit during the winter. To save more energy, temperatures can be turned down to 55 degrees while you are sleeping or when the house is empty. Check with your doctor if you have a medical condition that requires different temperatures. If you have had problems with freezing pipes during very cold weather, correct the problem before turning down the thermostat. Lowering the temperature setting for energy savings is recommended during times when the house is unoccupied, such as when you are at work or on vacation. You can save 1 to 3 percent on your heating cost for every degree you lower your thermostat for eight hours, or similarly save on your cooling costs by raising the temperature for air conditioning.

Programmable thermostats can be set to adjust the temperature in your house automatically. For example, they can turn the heat down every night at 11 p.m. and bring the temperature back up by 6 a.m. before you get out of bed. The newest kind of residential thermostat, a home energy manager, allows many temperature settings throughout the week. Depending on your lifestyle, a programmable thermostat can pay for itself in as little as one or two years.

Is your [illegible] working well?

system to distribute heated or cooled air from a central furnace or air conditioner. Most residential cooling systems in America have forced-air distribution systems that use air ducts to move warm (or cold) air to the rooms of the house. If the duct system leaks, it can waste large amounts of energy.

Any ductwork located in an unheated or uncooled space (such as an attic or crawl space) has a high potential for heat or cold air loss. Ducts in such spaces should be insulated. Also, all joints in the duct system, everywhere in the house, should be properly sealed to make sure all of the warm or cool air gets where you want it to go.

> **Safety note**
> Your home receives outside air from all small holes and cracks in the structure, including any holes in the duct system that are located outside the conditioned space (such as an attic or crawl space). Duct sealing is a job best left to a professional.

Sealing a leaking duct system will reduce the amount of heated or cooled air lost to unconditioned areas and outside air that leaks into the home. Though this will reduce energy consumption, you must also be aware of how it might affect combustion appliances and air quality in your home. The precautions are listed in Chapter 5, "Indoor Air Quality."

In addition to supply registers in each room to deliver heated/cooled air, there must be a return duct to allow air to get back to the heating/cooling unit. Many newer homes do not have a return register in every room but rely on the space under a closed door to [illegible] a central return. If you have a room that seems [illegible] the problem. You can increase the cut under the door or call a heating and cooling specialist to resolve the problem.

[illegible] duct system [illegible] distribution piping [illegible] or ducts. It is important that insulation material. Cheap materials break down more quickly.

assessment.

	Low energy loss	Medium energy loss	High energy loss	Your loss potential
Age of heating and cooling equipment	Equipment less than 5 years old.	Equipment is 5 to 15 years old.	Equipment is older than 15 years.	
Maintenance of heating and cooling equipment	Filters are checked every month during use, and cleaned or replaced as needed. Equipment is serviced at least every two years.	Filters are checked and changed occasionally, and the system is maintained on a regular basis.	Filters are not changed or rarely changed, and the system is not maintained.	
Air-temperature thermostat	A programmable thermostat is installed. It is routinely used to minimize energy consumption OR an older thermostat present but temperature adjusted for nighttime or when gone.	A programmable thermostat is installed, but it is not used to modify temperatures at night or when the house is empty.	An older thermostat is in use. It is set to maintain a constant temperature.	
Duct location	All ductwork is located in heated / cooled space.	Some ductwork is located in unheated/ uncooled space.	All ductwork is located in unheated space.	
Ductwork in unconditioned space (if applicable)	All ductwork in unheated/uncooled space is insulated.	Some ductwork in unheated/uncooled space is insulated.	All ductwork is located in unheated/uncooled space and uninsulated.	
Return duct	There are air-return ducts in every room OR bedroom doors are left open.	There is one central air return. Bedroom doors are shut at night, but there is a 2 inch or greater space under each door.	There is one central air return. Bedroom doors are shut at night, and there is no space between the bottom of the door and the floor.	
Air-sealing ducts and registers	Seams in the duct system are caulked or sealed, and registers are in the room.	There are no visible gaps in the duct system.	Gaps are visible in the duct system or around registers.	

A boxed risk level

Part 1b – Preventing loss of heated (or cooled) air

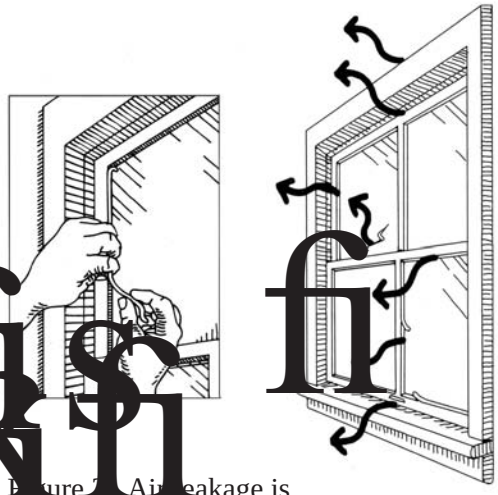


Figure 1. Air leakage is often the primary cause of heat loss from windows and doors. Seal leaks with caulking and weatherstripping.

Have you air-sealed your home?

Information Center (1-877-337-3463), or check out some of the websites listed under "Resources" at the end of this chapter.

Safety note

** *Proceed with caution.* ** As stated before, your home must be a healthy place to live. Air-sealing can cause

- If you have a gas cookstove that is not vented to the outside by a power-vented hood, do not extensively air-seal your home. Alternatively, open a kitchen window 1/4 inch while cooking and run an exhaust fan.
- If you have a high level of radon in your home, properly air-sealing can help reduce the problem. However, you should monitor radon levels carefully and contact a professional if the problem is not resolved. (See Chapter 5,"Indoor Air Quality," for more information.)
- If you have natural-draft appliances, such as gas water heaters, some gas stoves and some gas dryers, do not extensively air-seal your

sealing, insulation, moisture control and ventilation. A proper balance of these will provide a more comfortable, healthy home environment.

heat energy into or out of your home. The larger the R-value, the more heat (or cool air) is kept where you want it.

The recommended amount of insulation for a home varies with geographic locations. If you have extreme temperatures in your part of Michigan, you will need more insulation. Check with your local building supplier. You can also go to the Oak Ridge National Laboratory website for R-value recommendations based on your zip code (www.ornl.gov/sci/roofs+walls/insulation/ins_16.html).

✔ Assessment 1b – Preventing Loss of Heated (or Cooled) Air

Refer to the sections above if you need more information to complete the assessment.

	Low energy loss	Medium energy loss	High energy loss	Your loss potential
Attic	All potential leak points are sealed or weather-stripped.	Only some potential leak points are sealed.	Most potential leak points are not sealed.	
Windows and doors	All windows and doors are sealed with caulk and weather-stripping and tested for leaks. Newer, well-sealed, double-paned windows are installed.	Only some windows and doors are caulked and weather-stripped. Older or leaky storm windows are used. Some windows are sealed in winter with plastic sheets.	Windows are older and not sealed. Storm windows may be absent.	
Basement or crawl space	Rim joists, sill plates, service entrances, windows and wall cracks are sealed with caulk or foam.	Leaks have been detected but are not fully sealed.	No sealing has been attempted.	
Attic insulation	Insulation is equal to or greater than levels recommended for my region.		Insulation is well below the recommended level OR attic is not insulated.	
Insulation in walls (above-ground)	Exterior walls are insulated with 3-inch to 5-inch batt.		There is no insulation in wall cavities.	
Insulation in walls (heated basements)	Exterior walls are insulated with rigid foam or batt, according to recommendations.		Exterior walls and rim joists are not insulated.	
A boxed risk level				

Reducing Energy Loss

Part 1c – Increasing efficiency of domestic water heaters, lighting and home appliances

Water heaters

After heating and cooling your home, heating water for domestic consumption is the next largest energy user. There are several ways to reduce the amount of energy you use to heat water.

temperature will save you 3 to 5 percent on your annual water heating bill. Lowering the water temperature will also increase the lifetime of your water heater and reduce the risk of someone being burned by hot water. Children and elderly

optimal dishwashing performance.

Wrapping your water heater with insulation can reduce heating energy use by 4 to 9 percent. Except for some new water heaters that come with high levels of foam insulation and do not need any more, the addition of insulation usually pays for itself in less than a year. Water heater insulation kits are available at hardware and home improvement stores. Follow the manufacturer's instructions for the installation.

in cold rather than hot water will also save energy.

Lighting

incandescent bulbs with CFLs in the lights that you use the most.

Choose outdoor lights with photocell units or motion sensors (or both) that turn the light on only when someone is present. Also consider CFLs for exterior lights (remember to include a cold-weather ballast).

Appliances

Refrigerators, clothes washers and clothes dryers are the common home appliances that use the most energy (Figure 4). When you need new appliances, look for the ENERGY STAR® label. Refer to the appliance's Energy Guide label for information on annual energy consumption and operating cost. Consider unplugging appliances that are not used regularly—many continue to use energy even when not actively used. Also, unplug electrical converters when not in use—they too continue to use energy. See "Resources" at the end of this chapter for ENERGY STAR® information.

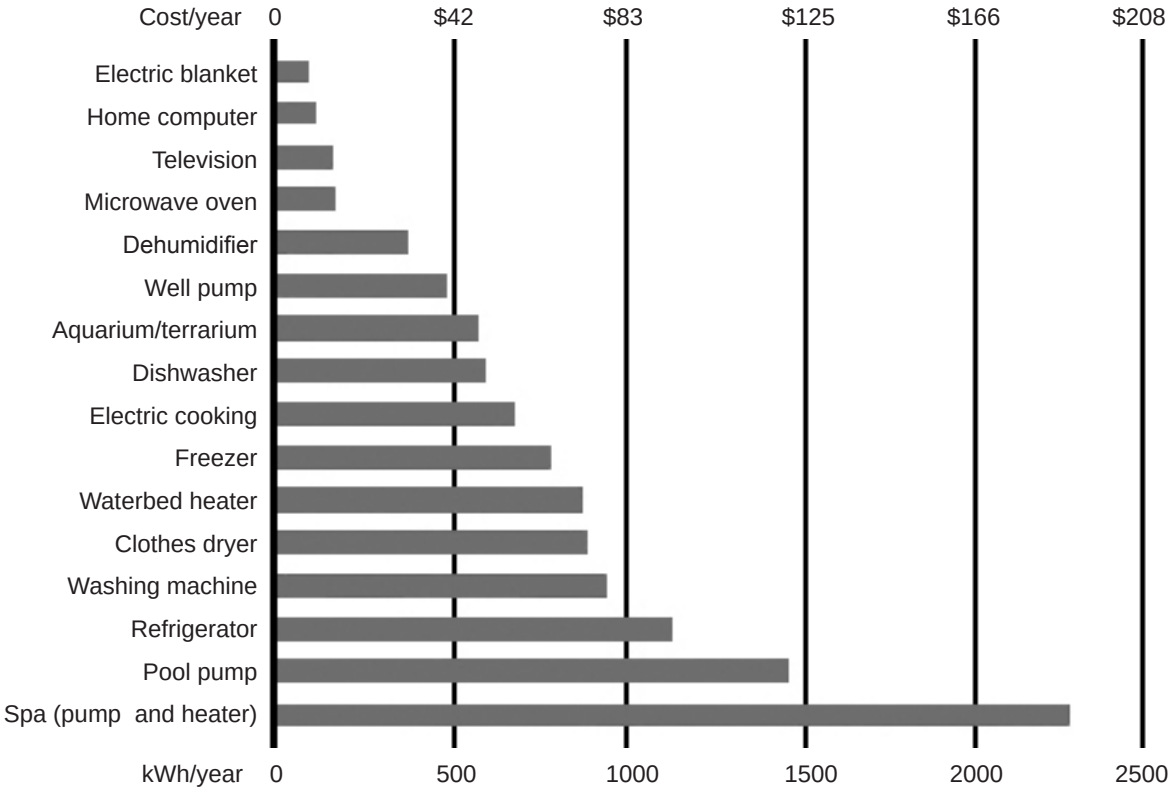


Figure 4: This chart shows how much energy a typical appliance uses per year and its corresponding cost based on national averages. *Energy Efficiency and Renewable Energy Information Center.*

✔ Assessment 1c - Increasing Efficiency of Domestic Water Heaters, Lighting and Home Appliances

In the assessment on the opposite page, indicate your potential energy-loss level in the right-hand column. Refer to the sections above if you need more information to complete the assessment.

	Low energy loss	Medium energy loss	High energy loss	Your loss potential
Water temperature setting	Water heater thermostat is [illegible]. Dishwasher has temperature booster turned on.	Water heater thermostat is [illegible]. Dishwasher has temperature booster turned on.	Water heater thermostat is set at [illegible]	
Insulation	A new, highly insulated water heater with added heater blanket is installed.	No heater blanket, but water heater is inside heated house (vs. garage).	An older water heater with no added blanket is in use.	
Hot water conservation	[illegible] installed, and there are no leaking faucets. Clothes are washed in cold water where possible. A conscious effort is made to conserve hot water.	There are no leaking faucets. Clothing is sometimes washed in cold water. Some effort is made to minimize hot water use.	There are leaking [illegible] faucets and [illegible] installed. Clothes are rarely washed in cold water.	
Pipe insulation	[illegible] water pipes are insulated.	Some [illegible] water pipes are insulated.	The [illegible] insulated.	
Energy-efficient bulbs	(CFLs) are used in all instances in the home.	(CFLs) are used in lights with greatest usage.	light are not used at all.	
Energy conservation	Turn off all lights, televisions and power to other appliances when not in use.	Indoor and outdoor lighting is on timers and used only for security reasons.	Lights, television, stereos and other appliances are left on regularly.	
Energy conservation	ENERGY STAR® label appliances chosen [illegible] purchase.		No attempt [illegible] choosing energy [illegible]	

A boxed risk level

Part 2 – Landscaping for Energy Conservation

Landscaping can help conserve energy as well as beautify your property. During the summer, properly placed trees and shrubs can reduce your cooling costs. In the winter, well-placed trees can reduce heat loss by plants that are relatively pest-free and by designing a landscape that requires minimal water and fuel to keep it attractive.

The four main goals of energy conservation landscaping in Michigan are to:

- Maximize the amount of heat obtained from the sun during winter.
- Maximize shade during the summer.
- Protect buildings from winter winds.
- Channel summer breezes toward the home.

Is landscaping for energy conservation worth the effort?

A well-designed landscape can save you money on your energy costs. Consider that a young, 8-foot shade tree may cost about as much as an awning for a large window. As the tree grows, it will shade far more than a single window and will provide hundreds of dollars of savings during its useful life. Deciduous trees provide summer shade and then lose their leaves in the autumn. This allows the sun to shine on the house and provide winter warmth. The combination of shade and evapotranspiration, the process a plant uses to release water vapor for cooling, can reduce air temperature as much as [illegible] have been recorded [illegible] homes. Such air leaks can [illegible] in the home. [illegible] home plan [illegible]

the sound from nearby roads or other sources of noise. Plants also remove particulate matter from the air and help control soil erosion, both of which help reduce pollution.

Develop a plan for the landscape around your home. Include all the existing features and plants and note the location of windows. Make sure the locations of underground utilities have been included. Then use arrows to show sun angles and the direction of prevailing winds for summer and winter. This will help determine which areas need summer shade and where windbreaks should be planted. Also, note the location or source of noise that could be blocked or reduced by landscape plantings. A landscape is an extension of the indoor space. Note frequent use areas such as play areas for children, storage areas, areas dedicated to pets and other uses. Make sure that landscaping installed for energy conservation does not block views that are important to the family. Give yourself a year to complete your landscape plan. This provides the opportunity to see how wind and sun affect your home in all four seasons. Make notes on the plan about the weather characteristics you would most like to modify. This will help set priorities when determining exactly which energy conservation choices you will incorporate into your landscape. A landscape that helps conserve energy can still be a source of enjoyment and beauty.

✔ Action Checklist

Go back over the assessments and record all high and medium risks and energy-loss potentials. Next, list the improvements you plan to make. You can use recommendations from this chapter or from other sources to help you pick actions you are ready to take. Next, decide when you will do them and put them on a schedule. You don't have to do everything at once, but try to eliminate the most serious problems as soon as

Write all high and medium energy-loss potentials here.	What can you do to reduce the energy-loss potential?	Target date for action:
Example: Water heater is not insulated.	Buy a ready-made insulation blanket at the hardware store.	One week from today: March 8

Resources

Basic home energy audit
www.cityofames.org/ElectricWeb/SelfAudit/Default.htm or call 515-239-5177.

Energy demonstration centers in Michigan
www.michiganrenewablepower.com

1-877-337-3463 or www.eere.energy.gov
On the website, go to "Quick Links for Consumers," then choose "Your Home." This site provides information on appliances, lighting, space heating and cooling, water heating, energy audit and much more.

ENERGY STAR® information
www.energystar.gov

Michigan home energy services and resources
www.michigan.gov

Select

web: www.emdc.msue.msu.edu

See the following bulletins for more information on home maintenance and improvement":

E2788 Ch Home
E2789 Ch

E2793 C
E2794 W

E2796 Geotherm Heating
E2797 Choosing Furna
E2798 In
E2799 La

This Home*A*Syst chapter covers a variety of topics to help homeowners examine and address the most important energy concerns. See the checklist at the beginning of this chapter. For more information on

This chapter was adapted from U.S. Marshall Extension Bio

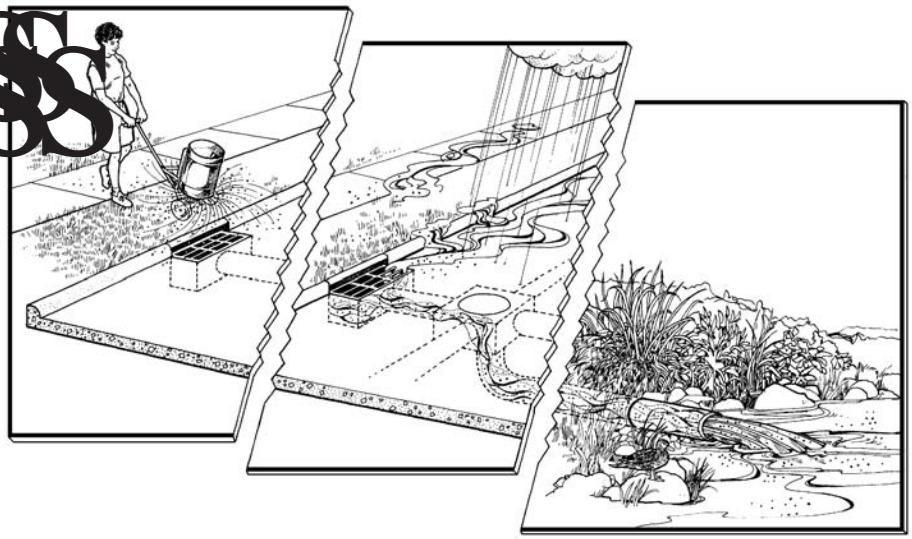
adapted from Michigan by Linda Dow and Suzanne Ebright, Michigan

HOME* A*SYST
Home Assessment System

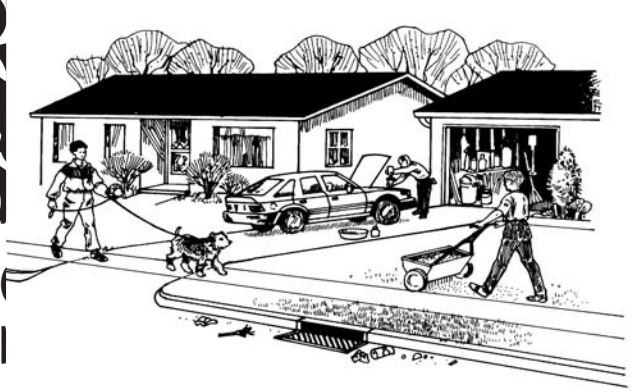
Chapter 7. Managing Stormwater around Your Home

Michigan Groundwater Stewardship Program

MICHIGAN STATE UNIVERSITY EXTENSION



or stream.



	Lo… re…	M…	…ur…	Your …
Storage of pesticides, fertilizers and other potentially harmful chemicals	sto…			
Handling and use of pesticides, fertilizers and outdoor chemicals		…hen …		u…
Vehicle washing				
Motor wastes	ru…			or …

A box…

Continued on next page...

...Assessment 1 continued

			Your risk
Pet and animal wastes			
Grass clippings, leaves, mulch and other yard waste			

A box

Part 2 – Landscaping and Site Management to

✔ Action Plan

Write all high and medium risks here.	What can you do to reduce the risk?	Target date for action:
Fertilizer and pesticides stored on soil floor in storage shed.	Put fertilizer bags in plastic covered storage bins, put on shelf out of hazard of flooding.	One week from today: May 15

Resources

"Lake Scaping for Wildlife and Water Quality"

"Landscaping for Water Quality"

www.RainGardens.org

HOME* A*SYST
Home Assessment System

Chapter 8. Conserving Water around Your Home

"When the well's dry, we know the worth of water." – Benjamin Franklin

This chapter helps you understand the importance of water and the water cycle. It also examines the need to conserve water. Two areas are covered:

1. Reducing water usage indoors
   - Plumbing leaks
   - Insulated water pipes
   - Bathroom considerations
   - Water turn-off valves
   - Water-conserving appliances
   - Water conservation practices
2. Reducing water usage in yard and garden
   - Landscaping choices
   - Lawn care practices
   - Irrigation techniques
   - Soil improvements and cultural practices
   - Washing vehicles

Why should you be concerned?

Water is essential for life. Humans can survive for about a month without food but only about seven days without water. Water, however, is a limited resource. We have the same amount of water on earth today as thousands of years ago. It moves around in the water cycle (Figure 1), so areas that may have been wet may now be dry or vice versa. There is no new water—the water is reused and recycled. For example, an apple may contain rain water from yesterday, which was water that fell hundreds of miles away a year ago and was also drunk by a dinosaur millions of years ago.

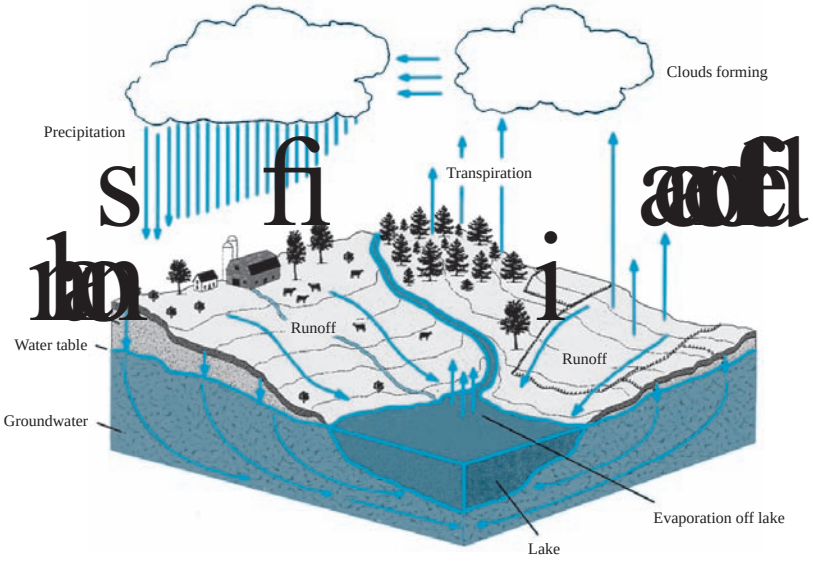


Figure 1: The water cycle.
"Understanding Groundwater."
Institute of Water Research/ Center for Remote Sensing, MSU.

The water cycle

Water moves from land to groundwater to surface water to air (Figure 1). **Precipitation**—rain, snow, sleet and hail—brings water to the earth. This is taken up by the ground through **infiltration**. Plants may take up the moisture and release it back to the air through the process of **transpiration**. Some of the precipitation runs off the surface of the ground and into surface waters such as lakes and streams. These bodies of water may lose water to groundwater if the water table is low or gain water from groundwater if the water table is high. These bodies may also lose moisture through **evaporation,** which occurs even in cold weather if the water is not ice-covered. In Michigan, the water moves to the Great Lakes and then on to the Atlantic Ocean.

Michigan Groundwater Stewardship Program

MICHIGAN STATE UNIVERSITY EXTENSION

Do we have enough water?

Most of the water on earth (about 97 percent) is salt water, which is costly to convert to usable water for consumption by plants, animals and humans (Figure 2). Fresh water makes up only about 3 percent of the earth's water, and most (two-thirds) of this is frozen polar ice caps and glaciers. Fresh groundwater and surface water make up 31 percent. With global warming and melting of the ice, we are losing more fresh water to the saltwater oceans.

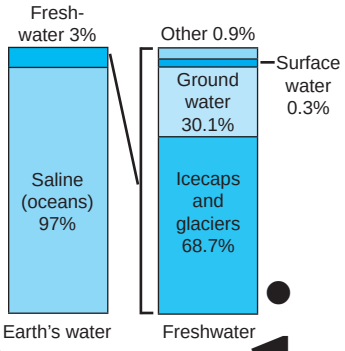


Figure 2: Distribution of Earth's water. *U.S. Geological Survey.*

Demand for water is increasing globally. Drought, overpopulation, increased usage and pollution are all contributing to the water crisis. Global consumption is doubling every 20 years, which is more than twice the rate of population growth. Solutions to overextraction, pollution and wasteful use of water resources will be needed in the future. Over a billion people in the world lack access to drinkable water. The world's 6 billion people are already using about 54 percent of all the accessible fresh water contained in rivers, lakes and underground aquifers. According to data collected from NASA and the World Health Organization, 4 billion people will face water shortages by 2050.

Michigan, the Water Wonderland, is blessed with the surrounding Great Lakes (20 percent of the world's fresh surface water). However, this does not mean that overuse or mismanagement of our water resources cannot affect our lakes, streams, wetlands, wildlife, plant life, agriculture, industry or economy, or our future water use. As populations grow, controversies grow over who controls the water. Our precious water resources need to be protected and conserved for current and future generations.

Conserving water around the home can help reduce energy costs for heating water, water pumping and wastewater treatment costs. If you have a septic system, water conservation practices can help reduce the size (and cost) of the system that you will need. If you are also on municipal water and sewage, the more you use, the more you pay. Water conservation can mean homeowner as well as community savings.

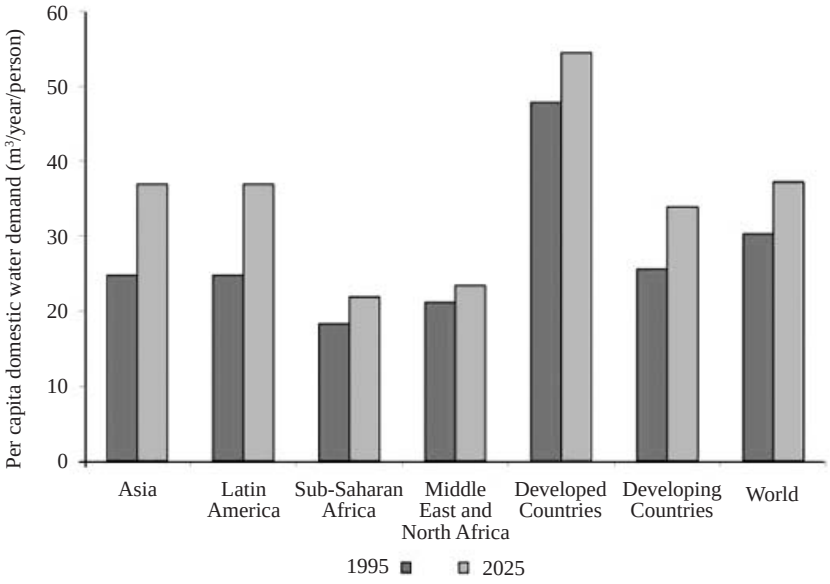


Figure 3: Per capita household water consumption for the world and by region for 1995 and a business-as-usual projection for 2025. *Global Water Outlook to 2025: Averting an Impending Crisis.*

How can I conserve water?

"Water is not like oil. There is no substitute." – Dr. Mark Rosegrant, International Food Policy Research Institute.

Drought, overpopulation and pollution are all contributing to the water crisis, but so are water waste and overuse. The domestic water consumption per person for the world and by regions of the world is shown in Figure 3 with a projection for 2025 if there is no change in behavior and with current population and other projections.

Part 1 - Reducing Water Usage Indoors

Water use estimates vary, but the U.S. Geological Survey states that the average American uses 80 to 100 gallons of water in the home daily. That's a lot of water! Reductions can be made through repairing leaks, using new technologies and changing water use behaviors. See what you can do to make a difference.

Do you have plumbing leaks?

Plumbing can be a source of leaks and water loss. If you are on a public water supply, check the water meter when no water is being used or is going to be used in the house. After two hours, check it again. If there is any usage shown, that indicates a leak somewhe[illegible] you have a [illegible]ivate well and you can hea[illegible] the pump come on re[illegible]larly w[illegible]en you're not [illegible]ing water, you hav[illegible] a leak. The l[illegible]ak m[illegible]y b[illegible] a[illegible]

[illegible] generally can be repair[illegible] simply by replacing the washer.

Bathroom conside[illegible]ions

[illegible]

o[illegible] [illegible]ced in t[illegible]toilet tank to save water.

Sto[illegible] [illegible] of [illegible] [illegible] bugs and

Pr[illegible] [illegible] ge[illegible]

and, in some heads, increase the spray by adding air, creating turbulence or pulsing. Consumer product evaluations have shown consumer satisfaction with many of the heads that are now available. Before you check out the new showerheads, installing anti-scald valves below your water heater's temperature may be recommended to prevent scalding.

Are your hot water pipes insulated?

Hot water takes longer to reach you in cold pipes because the water cools as it passes through. Insulating pipes with split foam pipe insulation (see Chapter 6, "Energy Savings for Your Home") allows faster delivery of hot water, saving water, energy and money.

Equipment	Gallons per use	Savings
Toilets		
Conventional	5-5.5	
	3.5	36%
	.8-1.6	up to 85%
Showerheads (per min.)		
Conventional	5	
	2.5	50%
Bath		
Full tub	30-45	
1/4 to 1/3 full	9-12	60-80%
Faucets (per min.)		
Conventional	3	
	2	

Equipment/activity	Gallons per use	Savings
Washing machine		
Conventional top load	37	
Wash recycle	26	30%
Front load	21	43%
X-axis	17.5	53%
Shaving		
Open tap	5-10	
1 full basin	1	80-90%
Dishwashing		
By hand - open tap	30	
Dishwasher - full load	10-15	50-66 % over open tap
By hand - full basin, wash & rinse	5	83% over open tap

Do you and members of your family know where the water turn-off valves are?

The first is main valve for the water supply system, whether you have a curb valve or city water. The last is the valve at the fixture, this might be a sink is a hot and cold water turn-off valve that controls water to the faucet. Toilets, clothes washers and dishwashers also have turn-off valves.

Do you have water-saving appliances?

machines can save .3 to 5 gallons per load. Front-loading washing machines use less water than top-loading types. A few washing machines have suds-saver systems that put the wash water into a tub or pump it into a built-in tank. The wash water is stored and is pumped back for reuse for another wash load. The rinse cycle continues to be a single use.

New water softeners do use less water than older models. Water softeners take the hardness, calcium or magnesium, out of water by exchanging it on a column with sodium (in most softeners) or potassium (which is better for the environment). Your plus sign checks to see if your softener needs to refresh the column with salt or potassium to it. Older softeners do not have a sensor and refresh when the column needs it.

Do members of your family practice water conservation when they use water?
Teach members of the family to turn off the water in between various operations such as wetting the toothbrush and brushing, cleaning the shaver and shaving, or wetting the hair and soaping the hair. It saves water. Taking shorter showers and turning the water off between soaping up and rinsing is a good practice. A 4-minute shower uses 20 to 40 gallons of water, depending on your shower head.

Hand washing of dishes using one side of the sink with soapy wash water and the other side with rinse water is more conservative than rinsing them with continuous running water (see Figure 4). Using water from a chilled refrigerator dispenser or from a pitcher of water in the refrigerator saves running the faucet until the water is cold for a drink. Running fully loaded dishwashers and clothes washers provides optimum water conservation. For partial loads, conserve water by adjusting the water levels to match the load size.

Using a garbage disposal requires running water. If you have a septic system, this also means that you are adding more organic matter to the septic tank. Excessive use of garbage disposals can overload your septic system (see Chapter 9, "Caring for the Yard and Garden").

✔ Assessment 1 – Risks Related to Indoor Water Usage

Use the following assessment to identify potential risks for increasing water use and putting your home at risk. Check the box that best describes your risk. Circle the response that best describes your risk. Complete this assessment.

	Low risk/ recommended	Medium risk/ potential risk	High risk/ unsafe situation	Your risk
Plumbing	Water meter or well pump indicates no change over 2-hour period when water not used, therefore no leaks. No leaks you see or hear.		Faucets drip and/or toilet leaks water from tank into bowl, and/or plumbing joints leak.	
Toilet	Toilet type	Toilet tank displays [illegible]	No [illegible] present [illegible]	

A boxed risk level

Continued on next page...

...Assessment 1 continued

	Low risk/ recommended	Medium risk/ potential risk	High risk/ unsafe situation	Your risk
Toilet usage	Toilet used only for human waste and tissue. Lid of tank closed. Toilet doesn't stay open.	Toilet rarely used for small bits of non-human waste.	Toilet used for trash disposal. Lid of tank open. Toilet is stuck open. Have no idea	
Shower	Water-saving shower heads installed. Shower turned off when soaping up and shaving. Showers 5 minutes or less.	Water-saving shower head not present, but short showers taken.	No effort to save water during showering. Showers longer than 5 minutes.	
Faucets	Faucets tightly turned off after each use. Water turned off after wetting toothbrush, soaping hands, shaving or shampooing. Faucets repaired as needed.	Some faucets with aerators present. Faucets generally turned off. Repaired as needed.	Most faucets with aerators present. Faucets often left running. Faucet left running while brushing teeth, soaping hands, shaving or shampooing in shower. Dripping faucets present.	
Main / sub water valve locations	Family knows how to turn off main water valves and valves under sinks, toilets and appliances.	Valves located but inoperable or inaccessible.	Family has no idea how to turn off water if major leak occurs.	
Wash machines	Automatic dishwasher and clothes washer run fully loaded. When purchasing new equipment, machines that conserve water selected.	Partial loads run, but water levels adjusted accordingly.	Partial loads run without adjusting water levels. Water conservation never considered when purchasing new equipment.	
Hand dishwashing or produce washing	Dishes washed in soapy water on one side of the sink and rinsed in water held in the other side. Vegetables washed in sink or pan.	Water run to rinse dishes or wash vegetables but turned off in between.	Water run continuously while washing and rinsing.	
Food waste	Appropriate food scraps composted.		Garbage disposal used regularly. No composting done.	
Hot water pipes	Pipes insulated with split foam pipe insulation, allowing hot water		Pipes uninsulated.	

A boxed risk level

Using this checklist

Ideally you'll want to have your risks in the Action Risk level. See the recommendations in this chapter to help you make plans to reduce your risks.

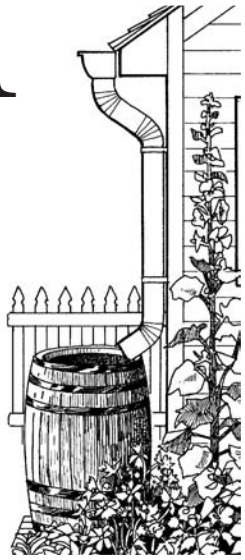
Part 2 - Reducing Water Usage in the Yard and Garden

Do you consider your landscaping?

Landscaping to minimize irrigation needs will save not only water but time and money. It's important to choose the right plants for your site, usage and region. Consider drought-tolerant and native plants—they have adapted to need less water or to your area's growing conditions. When planning a lawn, consider the amount needed and whether other more drought-tolerant plantings might be used to decrease the amount of thirsty turf.

What are your lawn care and irrigation practices?

Lawn care is often the biggest user of water at the home. See Chapter 9 for recommended lawn watering and water-saving ideas. There are ways you can conserve water while irrigating. Using a water meter will help you put down the amount you intend. Turning the water [illegible] when it [illegible]



Have you considered [illegible]

You can also improve [illegible] soils. It increases water-holding capacity in sandy soils and helps rain to soak in rather than run off of clay soils. Mulching decreases water loss by slowing evaporation from the soil and reduces weed competition for water and nutrients.

Using rain barrels to collect rainwater for your garden allows you to use the water gathered from gutter downspouts from your roof. A screen over the barrel will prevent mosquitoes from taking advantage of the water, too.

Washing with a hose uses about 50 gallons every 5 minutes. Sweeping a sidewalk or driveway rather than hosing it clean is a big water saver.

Have you checked your outdoor plumbing?

How many [illegible] drive [illegible] see [illegible] running [illegible] directed [illegible] the street [illegible]

tubs, pools and other equipment to ensure that you are not wasting water and your money. Also, Michigan winters commonly cause damage to undrained or unprotected outdoor piping. Draining lines that are not frost-protected will keep them from bursting.

Swimming pools with cracks can easily lose a lot of water. These pools need regular "topping up". Place a tape or mark at the water level to see how much it drops in 24 hours when the pool is unused. If water loss is less than ¼ inch per day, your pool is simply showing evaporative loss. If more, then check to determine where the loss is occurring. A recirculating pump is a water saver. Have it checked to make sure it is working properly.

Water features can be water wasters. Fountains send water into the air to be easily evaporated. Children's water slides with constant running water from a hose overwater a single spot on the lawn. Before choosing such features, consider the water usage impact.

Assessment 2 – Risks Related to Outdoor Water Usage

Use the following assessment to identify your water conservation efforts. Place a check mark in the box that best describes your situation. Refer to the information in this chapter if you need help to complete this assessment.

	Low risk/ recommended	Medium risk/ potential risk	High risk/ unsafe situation	Your risk
Plant types	Drought-tolerant or site-appropriate plants chosen when selecting new plants for yard and garden.		No effort made to minimize use of water-thirsty plants.	
Watering	Sprinklers monitored and kept adjusted so only lawn or gardens are watered, not roads and storm drains.		Sprinklers poorly monitored and commonly watering unvegetated surfaces, causing runoff.	
Irrigation	Drip irrigation or soaker hose used for trees, shrubs and gardens. Water meter present on hose or water system that you turn on and off on the basis of conditions.	Drip irrigation or soaker hose used but without water meter.	Sprinklers used for trees, shrubs and garden. Irrigation done during windy and high evaporation (hot) periods of day. Watering system turned on automatically, and no provision made for plants' needs and weather.	
Mulch	Organic mulch or weed preventive, water-permeable matting with mulch or stones used in gardens. Weeds removed.	No mulch used, but weeds removed.	No mulch used and weeds present.	
Cleaning	Driveways, sidewalks and impervious surfaces swept.		Water routinely used to hose off sidewalks, driveways and other impervious surfaces.	
Downspouts	Roof rainwater collected in a rain barrel for later use or directed toward trees and shrubs.		Roof downspouts allow rainwater to run off property.	
Outside equipment	No leaking couplings, faucets or hoses.		Leaks in pipes, couplings, faucets, hoses or attached equipment.	
Swimming pool	Water loss less than ¼ inch per week. Pool present and in good condition.		Water loss greater than ¼ inch per week. Pool present and in poor condition.	

A boxed risk level

Reducing Risks

As a way to reduce your risks, follow the instructions. Use the activities listed in the Suggested Activities box to develop plans to reduce your risks.

✔ Action Checklist

Check the items you assessed and the high and medium risks you found. Then list improvements you plan to make. Use recommendations from this chapter and other resources to decide on actions you are likely to complete. A target date will make you more likely to do it. 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 tackle the

Write all high and medium risks here.	What can you do to reduce the risk?	Target date for action:
Example: Water faucet in laundry room dripping.	Change washer in faucet.	One week from today: May 15

Resources

U.S. Environmental Protection Agency. www.epa.gov
Under "Quick Finder," click on "Water," then search "water conservation."

U.S. Geological Survey. http://ga.water.usgs.gov/edu/earthwherewater.html

Water Conservation. www.nrcs.usda.gov/feature/backyard/watercon.html

Water Conservation Tutorial. http://www.epa.gov/seahome/watcon.html
or http://cobweb.ecn.purdue.edu/~epados/farmstead/watcon/src/main.htm

"Water Conservation for Home and Yard." MSU Extension bulletin WQ 16.

"Water Usage." Linda Heaton, Cooperative Extension Service, University of Kentucky. ENRI-117.

For information on clothes washers rated under the USEPA and Department of Energy ENERGY STAR® program, see the ENERGY STAR® webpage at: http://www.energystar.gov/index.cfm?c=clotheswash.pr_clothes_washers.

For information on dishwashers rated under the USEPA and Department of Energy ENERGY STAR® program, see the ENERGY STAR® webpage at: http://www.energystar.gov/index.cfm?c=dishwash.pr_dishwashers.

This chapter was written by Roberta Dow, Michigan State University Extension, Michigan Groundwater Stewardship Program, 2008.

HOME*A*SYST
Home Assessment System

Chapter 9. Caring for the Yard and Garden

If yours is like most homes, it is surrounded by lawns, gardens, shrubs and trees that require regular maintenance. This chapter examines the potential impact of yard and garden care on the environment and on your health.

Topics:

- Soil testing
- Fertilizers, pesticides and alternative control methods
- Lawn type and maintenance
- Ground covers and erosion protection
- Composting
- Conserving water

For information about [illegible] those who live near water, refer to MSUE bulletin WQ-52, "Managing Shoreline Property to Protect Water Quality." For more information on lawn care, refer to MSUE bulletin WQ-53, "Lawn*A*Syst," and E0012, "Turf Tips for Water Quality."

Why should you be concerned?

Your yard and garden, the natural setting of your home, might be the last places you would look for pollution problems. However, behind beautiful landscapes are activities that may threaten your health and the environment. Homeowners need to recognize that their practices may have a major impact on the [illegible] runoff or when excessive soil erosion during a storm clogs fish and wildlife habitat and chokes lakes and streams. If [illegible] water wells or pollute nearby lakes and streams. Closer to home, children are particularly vulnerable to pesticides that are stored or used without proper safety precautions.

Indiscriminate watering of lawns and gardens wastes large amounts of clean drinking water. Gasoline-powered mowers, weed cutters, leaf blowers and other devices make noise and pollute the air. A lawnmower powered by a two-cycle engine spews in one hour the same amount of exhaust as a car driven 350 miles. It may seem that your contribution to pollution is minor, but the effects of chemicals, soil loss and wasted water from hundreds of thousands of homes in your region can really add up.

[illegible] trees and shrubs add [illegible] and value to a home. They allow stormwater to seep into the ground and help [illegible] air and water.

Michigan Groundwater Stewardship Program

MICHIGAN STATE UNIVERSITY EXTENSION

Are you [illegible] and [illegible]

Americans [illegible] on lawn and garden [illegible] time to caring for their yards and gardens. These inputs may be wasted, however, if you do not follow environmentally sound practices. Develop a management plan (see example plan in Figure 1). Think about the cost and effort to replace lawns or plants damaged by overfertilization, poor cultural practices such as scalping or misuse of pesticides. Areas with eroded soil are not only unsightly but require hard work to return them to productive use. Imagine how much less time lawn care would take if you did not rake and bag grass clippings.

Yard and Garden Management Plan	
Goals:	• Provide lawn play area for children. • Provide attractive setting for home with medium management and inputs. • Provide bird habitat.
Lawn:	• Plant grass type for site conditions (heat, cold, drought, shade, wear tolerances; fertilization needs; irrigation needs; and mowing height). • Fertility program [illegible] • Manage a[illegible] for lawn. • Two fertil[illegible] year [illegible] lb [illegible]ss per 1,000 sq. ft. per application – 1 fall a[illegible]lication (around Labor Day).
Mowing:	• Set mower height at no less than 3 inches. • Leave grass clippings on lawn. • Remove no more than one-third of the length of grass blades at each cutting (mow approximately once per week).
Irrigation:	• In-ground system present. Water lightly as needed.
Scouting:	• Look for wear from games when mowing; move usage if wear showing. • Scout for pest and disease problems (once per week).
Gardens:	• Test soil (every 3 years). • Fertilize according to nutrient recommendations. • Add compost when working up beds before planting. • Select native and pest/disease-resistant, low-maintenance, adapted, hardy perennial plants – include plants that provide year-round visual enjoyment as well as plants that provide bird habitat and food. • Select and site plants so that pruning is not an annual need. • Inspect plants for pests/disease prior to planting. • Develop IPM plan. • Plant perennials properly. • Mulch beds to prevent moisture loss and discourage weeds. • Keep mulch away from stems and trunks of woody plants. • Add mulch as needed over the years. • Automatic watering will be done according to a moisture meter in the soil.

Figure 1: Example of a short yard management plan.

You can have low-maintenance lawns without losing t[illegible] Good m[illegible] such [illegible] they ca[illegible] save [illegible] time and money.

When ch[illegible] pesticide, water, extensive maintenance), sustainable landscape plan**t**. **Native** plants that are adapted to your particular area have already demonstrated that they are survivors with your geography, climate and native pests. Native plants also provide food sources and habitat for native wildlife.

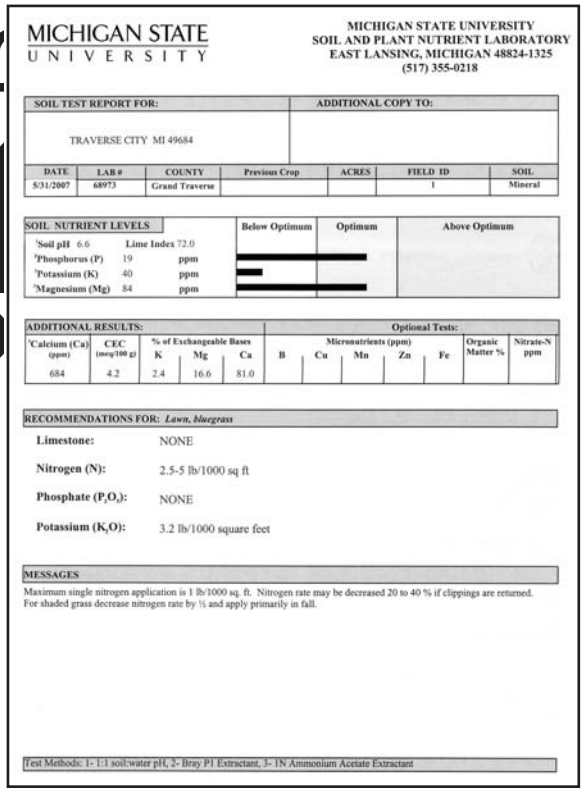
Whether using native or non-native species, avoid aggressive or invasive plants. Invasive plants outcompete other vegetation and can disrupt the natural balance of plant and animal resources in the area.

Managing your lawn, garden and landscaping

[illegible] water retention. First, determine the goals for your lawn and garden and include them in your management plan. Do you desire a natural garden with locally adapted or native plants, perhaps with little lawn and few annuals planting [illegible] lawn with formal [illegible] goals. Normal applications of lawn and garden products generally pose few problems. Poor maintenance, however, either through neglect or excessive chemical applications, can lead to disruption of the natural environment, soil problems, polluted runoff and unsafe well water.

Ha[illegible]

[illegible] takin[illegible] ne[illegible] In[illegible] pl[illegible] de[illegible]



MICHIGAN STATE UNIVERSITY

MICHIGAN STATE UNIVERSITY
SOIL AND PLANT NUTRIENT LABORATORY
EAST LANSING, MICHIGAN 48824-1325
(517) 355-0218

SOIL TEST REPORT FOR:	ADDITIONAL COPY TO:
TRAVERSE CITY MI 49684	

DATE	LAB #	COUNTY	Previous Crop	ACRES	FIELD ID	SOIL
5/31/2007	68973	Grand Traverse			1	Mineral

SOIL NUTRIENT LEVELS			Below Optimum	Optimum	Above Optimum
'Soil pH	6.6	Lime Index 72.0			
'Phosphorus (P)	19	ppm			
'Potassium (K)	40	ppm			
'Magnesium (Mg)	84	ppm			

ADDITIONAL RESULTS:					Optional Tests:						
'Calcium (Ca) (ppm)	CEC (meq/100 g)	% of Exchangeable Bases K	Mg	Ca	Micronutrients (ppm) B	Cu	Mn	Zn	Fe	Organic Matter %	Nitrate-N ppm
684	4.2	2.4	16.6	81.0							

RECOMMENDATIONS FOR: *Lawn, bluegrass*

Limestone:	NONE
Nitrogen (N):	2.5-5 lb/1000 sq ft
Phosphate (P_2O_5):	NONE
Potassium (K_2O):	3.2 lb/1000 square feet

MESSAGES

Maximum single nitrogen application is 1 lb/1000 sq. ft. Nitrogen rate may be decreased 20 to 40 % if clippings are returned. For shaded grass decrease nitrogen rate by ½ and apply primarily in fall.

Test Methods: 1- 1:1 soil:water pH, 2- Bray P1 Extractant, 3- 1N Ammonium Acetate Extractant

Figure 2: Soil test results from MSU soil testing laboratory.

Key to understanding soil tests

Nitrogen (N)
soluble in soil (may be lost [illegible]
in [illegible]

Potassium (K)
vigor, stress and disease [illegible] growth.

Magnesium (Mg)
from the [illegible]

Calcium (Ca)

pH
cer[illegible] containing sul[illegible]

Cation exchange capacity (CEC)
plant nutrients. This affects fertilizer management, nutrient loss and groundwater contamination. CEC [illegible] amount of humus (organic matter) in the soil. Generally, low CECs indicate sandy soils and high CECs indicate more clay or humus. These soils usually

standard soil test will determine the amounts of phosphorus, potassium, calcium and magnesium, the ion exchange capacity and pH (Figure 2). You receive a lab report for your sample and a fertilizer recommendation based on your soil test results and the plants you wish to grow. Soil tests should be conducted at least every three years.

[illegible]

What fertilizers do your lawn and garden need?

Your lawn and garden goals and the soil test results will determine fertilizer need and amount. Even if you hire a lawn care service or plan to use natural fertilizers such as compost, cow manure or other soil amendments, soil testing is important. It is particularly important for waterfront property, where phosphorus should be avoided unless applications are indicated by your soil test. If you live on a street that has a storm drain, think of yourself as living on a streambank, because you are likely connected to nearby surface water by underground drainage pipes. Look for earth-friendly or lake-safe fertilizers to promote lake and river protection. These fertilizers contain a high percentage of slow-release nitrogen and little or no phosphorus, and are free of pesticides (see "Resources" at the end of this chapter).

Nitrogen is the key plant nutrient for promoting a healthy lawn. Applied at the right time and in the right amount, it will be a major factor in achieving your goals. Applied at the wrong time and in the wrong amount, it will make conditions worse by damaging the lawn and increase the potential for nutrient [illegible] If [illegible] storm drain, [illegible] fertilizer. This applies especially to plants

What do the numbers on a fertilizer label mean?

The first number indicates the percentage of available **nitrogen (N)**.
The second number indicates the percentage of available **phosphate (P_2O_5)**.
The third number indicates the percentage of water-soluble **potash (K_2O)**.

How much fertilizer do you need?

Once you know what soil nutrients are present in your soil, you must also know the requirements of each plant type you are trying to grow. For nutrient recommendations, contact your local MSU

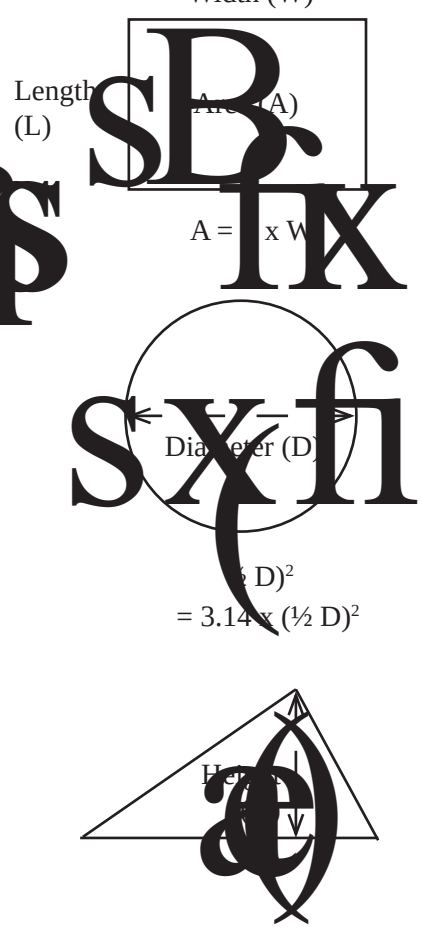


Figure 3: Calculating areas (A) of variously shaped lawns or gardens.

Are there alternatives to conventional lawn care?

of recommended grasses for your conditions. Proper mowing height is fundamental to a healthy lawn. Taller grass conserves water, prevents weeds and promotes drought tolerance. A mowing height of 2.5 to 4 inches is recommended as a general guideline and the mowing height third of the leaf is removed. If mowing grass appears fertilizer that only minimal additional fertilizer is needed to keep your lawn healthy. Clippings are a source of nitrogen, so you may be able to reduce fertilizer needs by 25 percent or more. Switching to a human- or electric-powered mower can cut down air and noise pollution. If you reduce your lawn size and grow plants that require little maintenance, such a mower can be practical.

If you hire someone to take care of your lawn, you can still do your part to make sure that your lawn is managed in an environmentally friendly way. Research lawn care companies in your area that reduce the overuse and misuse of fertilizers and pesticides in their services and that pay particular attention to avoiding these inputs from degrading our water resources. Such "healthy lawn" options may also include soil testing at the beginning of the season, use of slow-release fertilizers, reduced nitrogen applications, low- or no-phosphorus fertilizer options, providing customers with maintenance and cultural practices related to mowing and watering, and spot treating weeds only when necessary.

Oh, no! A spill!

Spills do happen. But they can be prepared. When a spill occurs, follow

1. **Caution:** be controlled or contained without endangering life or safety, then immediately call 911.

2. **Control:** If possible, control the source of the spill – shut off valves, plug holes or set containers upright.

3. **Contain:** Stop the spread of the spill to groundwater, surface water, wells or storm drains by using a shovel to make a soil berm or by applying an absorbent material such as cat litter.

4. **Communicate:** Contact the appropriate authorities, if necessary:
   a. Danger to health or safety: emergency number 911.
   b. Danger to groundwater or surface water: Michigan Department of Environmental Quality Pollution Emergency Hotline: 1-800-292-4706.

5. **Cleanup:** For a dry spill, sweep up product and dispose of properly or use as intended. For a wet spill, use cat litter, activated charcoal or sawdust to absorb the chemical, then sweep up and dispose of the material properly. Never wash a spill down a drain. Most drains lead directly to lakes, rivers or streams.

Be prepared—make a spill kit!

A spill kit is a very handy item to keep around the house should chemicals leak or spill. A spill kit contains items to assist in the cleanup of dry or wet spills in one handy box.

- Plastic storage tote – Holds materials in one location.
- Safety goggles – Protect eyes, one of the most sensitive areas on the human body.
- Chemical-resistant gloves – Nitrile gloves are suitable for most household chemicals. Leather gloves or gloves with linings do not provide adequate protection.
-
- Garbage bags – For easily handling of leaky or spilled material.
- Cat litter, oil absorbent or sawdust – To soak up liquid spills before sweeping and disposing.
- Emergency telephone numbers – To seek help if needed.

Some types of pesticides:
(chemicals that kill or repel pests)

- Insecticides
- Herbicides
- Fungicides
- Rodenticides
- Nematicides
- Miticides
- Algaecides

Are pesticides the best solution?

Always identify the problem before you treat. Many plant problems are not caused by insects or disease but are related to temperature extremes, waterlogged soil, drought, lawn mower damage and overuse of chemicals. Learn when and where pesticides are needed. Some pests require that the biology and chemistry of the pest be understood before they can be controlled. Some pests are only present for a few weeks. Some pest problems will correct themselves. Before you treat, be sure to ask yourself if, for the sake of clean groundwater and an environment with fewer chemicals, you can tolerate a few more weeds and bugs in your yard.

Are you using pesticides unnecessarily? Do you spray the whole lawn if you have only a few weeds? Spot applications directed to the pest problem avoid overuse. Keep kids and pets off the treated lawn per label instructions.

Do you use integrated pest management?

Practicing integrated pest management (IPM) in your yard to maintain healthy plants involves the use of a variety of strategies to control pest and disease problems. IPM involves three methods of control: cultural, biological and chemical. Weeds can be controlled by hand pulling or hoeing, and you can pick bugs off of vegetables and garden plants. Clean up diseased leaves. Insects and diseases are usually present in small numbers. Problems occur when pests reproduce rapidly (see life cycle) and overwhelm the host plant. Proper identification of the pest is necessary to determine the best control. Sometimes changing habitat by pruning to allow more sunlight (see shade) and changing watering practices will help. Use the least toxic chemical control first, such as insecticidal soaps. Follow directions carefully, and mix only the amount you need. For IPM to work, you will have to give more time and attention to your yard and garden. Consider IPM strategies for your various plants in your management plan.

More yard and garden tips that protect water resources

- ✔ Always store pesticides in original containers.
- ✔ Store pesticides and fertilizers away from drains and floor cracks.
- ✔ Always read and follow label directions.
- ✔
- ✔ Carefully measure area to be treated and products used.
- ✔ Avoid fertilizer and pesticide applications when heavy rains are forecasted. Delay irrigation after applications unless recommended on the label.
- ✔ Apply pesticides at the appropriate time in the pest or disease life cycle.
- ✔ Triple-rinse empty pesticide containers; drain the rinse water into your sprayer tank.
- ✔ Spot treat pest problems, when possible.
- ✔ Put together a spill kit. Avoid spills. Clean up spills quickly if they occur.
- ✔ Take unwanted or unusable pesticides to local Clean Sweep site or hazardous waste collection program. Check if your local program accepts cleanup wastes if you had a spill.

✔ Some IPM strategies

Strategy	Category of control	Example(s) or comments
Plant health plants are less susceptible to pests than plants under stress.	Cultural	Use resistant varieties appropriate for the site and conditions. Introduce only pest- and disease-free plants to your garden.
Sanitation—removing or reducing the number or source of the pests or disease.	Cultural	Remove dead, dying or insect-invaded plant parts or plants; rake up fallen diseased leaves; hand pull or cultivate to remove weeds; pick off snails, slugs or insects.
Barrier—preventing access.	mechanical	Put sticky material around a tree trunk or limb to prevent movement of caterpillars or scale insect crawlers or other pests; put cans open at both ends [illegible]
Trap—many types are now available for a variety of insect problems.	mechanical	Some traps attract only one sex [illegible] to aid [illegible] Home [illegible] with beer, or a grapefruit half partially hollowed out and turned upside-down on the ground so snails and slugs can collect under it. Trap crops (more attractive to the pest) may also be used to concentrate the pest or lure it away from other crops.
Crop rotation—you [illegible]	Cultural	Planting the same type of plant in the same place [illegible] control [illegible]
Microbial insecticides or fungi to control insect problems.		(*Bacillus thuringiensis*) or Japanese beetle grubs (*Bacillus popilliae*).
Insect predators (work best in controlled environments such as greenhouses)		Rele[illegible] control [illegible] plant-feeding mites.
Botanical insecticides (plant-derived)	Chemical	Planting marigolds to discourage nematodes in the soil. Pyrethrin-based insecticide derived from mums. Note: natural or plant-derived does not mean these products are non-toxic or non-chemical.
Synthetic pesticides	Chemical	Range of widely available chemical-based products to treat mite, insect, weed and disease problems.

Do your landscape practices help prevent soil erosion?

Like pesticides and fertilizers, soil washed away by rain can pollute streams, lakes or bays. Even if you do not live near water, soil will be carried there by runoff from storms. Gardens, sparse lawns and construction sites with areas of bare soil, especially on sloped land, are prone to soil erosion. You can protect [illegible] or retaining walls on slopes can also help prevent soil loss. Choose plants suited to the area and insect- and disease-resistant.

Do you make compost?

Composting is a cost-effective method in which bacteria and fungi decompose yard waste [illegible] etc., into a product called humus and nutrients and environmentally conscious way of recycling and improving soil. Soil [illegible] a pile or bin creates compost piles [illegible] other organic materials. You can simply put yard wastes in a pile, or you can install homemade or store-bought bins. In addition to yard waste, you can add vegetable trimmings and fruit peels from your kitchen. Your compost pile will remain relatively odor-free if it is turned and aerated regularly.

Finished compost is valuable. It can be mixed into garden soil or spread on lawns as a slow-release source of nutrients. One word of caution: animal manures may contain high levels of nitrogen, and manures from various types of animals have different levels. If manure is left in piles exposed to the weather, nitrogen-rich runoff may result. If you mix manure from horses, sheep, cows or other plant-eating animals into your compost, be sure to add plenty of leaves, straw, sawdust or pulled weeds to keep concentrations of nitrogen and other nutrients low. This will help prevent contamination of groundwater. Do not put pet wastes (from cats and dogs) in compost piles because of potential parasite and disease problems. [illegible] piles attract flies and [illegible] your local [illegible] library and your neighbors for ideas.

Ingredients to create a compost pile:

- ✔ **Green/moist:** Materials containing a high nitrogen content, such as grass clippings, coffee grounds, vegetable scraps.
- ✔ **Brown/dry:** Materials high in carbon, such as dry leaves, straw, wood chips and newspaper.
- ✔ **Microorganisms:** Naturally found in soil.
- ✔ **Water.**
- ✔ **Air.**

Items to keep out of the compost pile:

- ✔ Pet waste.
- ✔ Meat, eggs, dairy products and other animal products.
- ✔ Grease, oils or foods cooked with oils.
- ✔ Invasive weeds and seeds.
- ✔ Diseased plant materials.

used by your plants. If you convert your landscape to plants adapted to your area and weather, you will take the biggest step in conserving water. In dry, sandy sites, you may choose native plants that are drought-tolerant. Some perennials are hardier because their roots grow deeper than those of annual plants, requiring little or no watering once established. For more information on water conservation, see Chapter 8, "Conserving Water around Your Home." See Chapter 7 for more information on creating rain gardens for stormwater management.

Watering wisely

Most plants can tolerate at least short dry periods. Watering should be timed to meet the biological needs of the plants. Watering slowly and deeply helps non-turf plants develop deep roots; in the long run, your plants will need less frequent watering. Plants absorb only water

1.5 inches of water per week (Figure 4). An alternative to watering lawns is to allow

too. Watering prior to the hottest part of the day helps reduce stress on turf.

Figure 4: Sprinklers vary. To determine how much water your sprinkler is delivering, place a can with straight sides in the sprinkler path. Measure with a ruler the amount of water delivered in a given time period (example: 1 hour).

✔ Assessment – Yard and Garden Care

The assessment on the next page will help you identify potential environmental risks related to your yard and garden maintenance practices. For each question, put your answer in the box. Although some choices may not correspond exactly to your practices, do your best to complete this table.

	Low risk/ recommended	Medium risk/ potential hazard	High risk/ unsafe situation	Your risk
Fertilizers	Soil is tested for nutrients, and fertilizer is used as recommended.	Soil not tested, but fertilizer label is followed.	Soil is not tested. Fertilizer is used without regard to area and/or label instructions.	
Pesticides	Non-chemical methods considered for pest control. IPM used.	Chemicals are used according to label instructions.	Chemicals are used without regard to label instructions or conditions.	
Lawn (turf) type and maintenance	Turfgrass is suited to soil type, available sunlight and climate. Grass is regularly mowed to 2 1/2 – 4 inches in height. No more than one-third of leaf removed at mowing.	Turfgrass is suited to the site but is over-fertilized and mowed shorter than 2 1/2 inches.	Grass type is not suited to available light, soil type or climate. Grass is pest-prone and mowed shorter than 2 1/2 inches. More than one-third of leaf removed at single cutting.	
Ground cover and other plantings	trees and shrubs are planted to reduce soil erosion. Native or pest- and disease- resistant, hardy varieties selected.	A slow-spreading ground cover is used.	A hilly landscape or lack of ground cover allows soil erosion. Plants chosen require high maintenance and chemicals to survive.	
Composting	The compost pile is well-maintained: it is aerated regularly and contains yard waste, vegetable food scraps and a nitrogen source such as manure.	The compost pile is poorly maintained: it is not aerated or lacks the proper mix of materials. Dog, cat and other pet wastes are added to the pile.	The compost pile is poorly maintained: it contains excessive high-nitrogen sources, greasy meat or diseased plant material and is not turned regularly. The pile is less than 50 feet from a shallow well or surface water.	
Water requirements of plants	shrubs are able to survive with normal rainfall.	Landscape plants require light to moderate watering.	Heavy watering is required to keep the lawn and other plants alive.	
Watering methods	Watering done in the morning, only as needed. Low-water-use devices such as soaker hoses used for gardens. Sprinkler system is monitored.		Watering is done by time clock or daily without regard to need or weather conditions. There is excessive water runoff.	
Yard/garden management plan	Management plan present, clearly in goals and expectations.		No management plan present.	

A boxed risk level

Responding to risks

Your goal is to lower risks. Complete the Action Checklist to help you make plans to reduce your risks.

[illegible]

[illegible] as

Write all high and medium risks here.	What can you do to reduce the risk?	Target date for action:
Example: Mower set at lowest height so grass is stressed.	Set mowing height to highest setting	Before next mowing (one week from today: May 30).

Resources:

soil testing, lawn and garden care, composting, plant and pest hotline and diagnostic services, the MSU Master Gardener volunteer program and the Michigan Master Composter program. Also contact conservation districts, local garden centers, lawn or landscaping services. Local watershed councils are valuable sources of information on lakescaping (for those who live near water), watershed-friendly lawn and garden care, and stormwater management, including rain gardens.

MSU educational materials

MSU Educational Materials Distribution Center (Extension bulletins).
www.emdc.msue.msu.edu

Composting

Apartment Composting. 1998. Allen, Johnson and Leyerle.

Earth-friendly or lake-safe fertilizers

www.socwa.org Click on "Lawn & Garden."

Soil test

www.css.msu.edu/SoilTesting.cfm

MSU Extension soil web pages for consumers.
www.msue.msu.edu/monroe Click on "Soil Test Website" in upper right corner.

Lawn

turfgrass website above.

Turf Tips for Water Quality. MSU Extension bulletin E0012.

Hiring a lawn care contractor

A Guide to Selecting a Lawn Service: Questions to Ask.
www.socwa.org Click on "Lawn & Garden."

Choosing a Lawn Care Company: Guidelines on making informed decisions to help create and maintain a healthy lawn. MSU Extension bulletin E2771.

Lake

www.lre.msu.edu/extension/ShorelineManagement.htm

Lakescaping for Wildlife and Water Quality. 1999. Carol Henderson, Minnesota Department of Natural Resources. MSU Extension bulletin WQ57.

Restore Your Shore. 2002. Minnesota Department of Natural Resources. Available www.comm.media.state.mn.us/bookstore/bookstore.asp

Landscaping for Water Quality. DEQ. Jane Secord.
www.[illegible]documents/deq-wb-nps-Landscaping-for-Water-Quality.pdf

www.epa.gov/[illegible]copage/aquatic/lifedge.pdf

Native plants
Michigan Native Plant Producers Association (MNPPA).
www.[illegible]

www.epa.gov/greenacres/wildones

Integrated pest management (IPM)
www.[illegible]htm

MSU Extension bulletin E2979.

MSU Extension bulletin E2649.

Clean Sweep program
For unwanted pesticides and mercury. Program contacts list:
www.michigan.gov/mda. Enter "clean sweep contact information" into search bar.

Pesticides
National Pesticide Information Center, Oregon State University.
www.npic.orst.edu or call 1-800-858-7378.

Poison Control: 1-800-222-1222.

Stormwater management
7 Simple Steps to Clean Water: Tip cards on protecting water resources, including proper use of fertilizers and pesticides.
www.semcog.org

[illegible]

Michigan State University Extension. Updated in 2008.

HOME* A*SYST
Home Assessment System

Chapter 10. Protecting Your Drinking Water Well

Keeping your well water free of harmful contaminants is a top priority for your health and the environment. This chapter helps you examine how you manage your well and how activities on or near your property may affect water quality. This chapter covers:

1. Well location
   - How close is your well to potential pollution sources?
   - How might your soil type affect water quality?
2. Well construction
   - Do you know the age of your well, its depth and how it was installed?
   - Is your well casing properly sealed?
3. Water testing and unused wells
   - Have tests of your well water revealed any potential problems?
   - Are abandoned wells on your property sealed to prevent movement of contaminants?

Why should you be concerned?

The two sources of drinking water are surface water and groundwater. In metropolitan Detroit, for example, more than 3 million urban and suburban residents depend on surface water for their municipal drinking water supply. This surface water is obtained from Lake Huron and the Detroit River. Nationwide and in Michigan, about 95 percent of rural residents use groundwater for their drinking water. Private wells, tapping into local groundwater sources, provide clean, safe drinking water (Figure 1). However, improperly constructed, located or maintained wells can allow contaminants from your property to a neighbor's well or from beneath a neighbor's property to your well.

Some contaminants are expensive to remove. Your only options may be to treat the water after pumping, drill a new well or obtain water from another source.

Some rural residents use other water sources, such as springs, cisterns or unsanitary water sources for drinking water. Additional information on how to [illegible] Extension educators, [illegible] several environmental

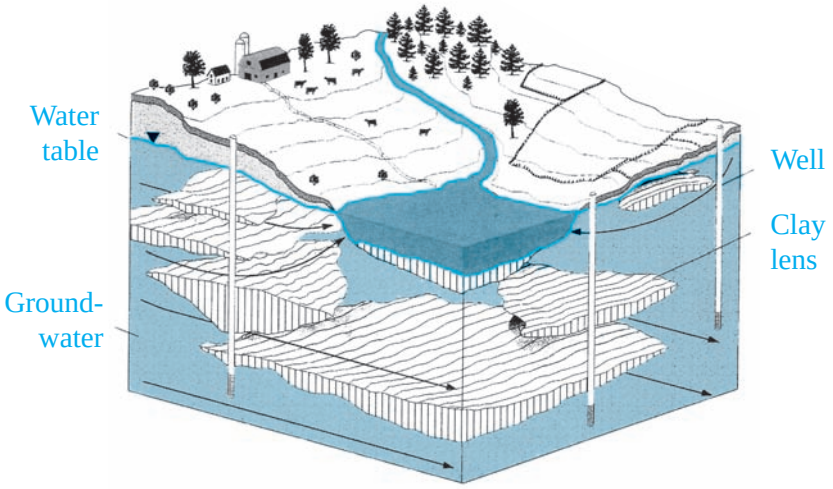


Figure 1: Cross-section of land showing land surface features, water table, clay and sand layers, and wells. *"Understanding Groundwater." Institute of Water Research/Center for Remote Sensing, MSU.*

Michigan Groundwater Stewardship Program

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Part 1 – Well Location

Your well's location in relation to other features on or near your property will determine part of your potential pollution risk. [illegible] information below will help you answer the questions in the assessment.

What [illegible]

void spaces of rock formations. Whether groundwater is just below the surface or hundreds of feet down, the location of your well on the land surface is very important. Installing a well in a safe place takes careful planning and consideration of such factors as where the well is located, [illegible] ris[illegible]

once it gets into groundwater. Changing the location or depth of your well may protect your water supply but not the groundwater itself. Any condition likely to cause groundwater contamination should be eliminated, even if your well is far removed from the potential source.

Most states require that new wells be located a minimum distance from sources of potential pollution (Figure 2). The Michigan Water Well Construction and Pump Installation Code provides minimum well isolation distances from various contamination sources and buildings. In general, it is best to provide as much separation as possible between your well and any potential contamination source—at least 50 feet. Additional distances are needed for some contamination sources. For example, agricultural chemical/fertilizer storage or preparation areas should be set 150 feet from any residential water well, and fuel storage (both buried and aboveground tanks greater than 1,100 gallons without secondary containment) should be 300 feet from the well. Separating your well from a contamination source may reduce the chance of pollution, but it does not guarantee that the well will be safe.

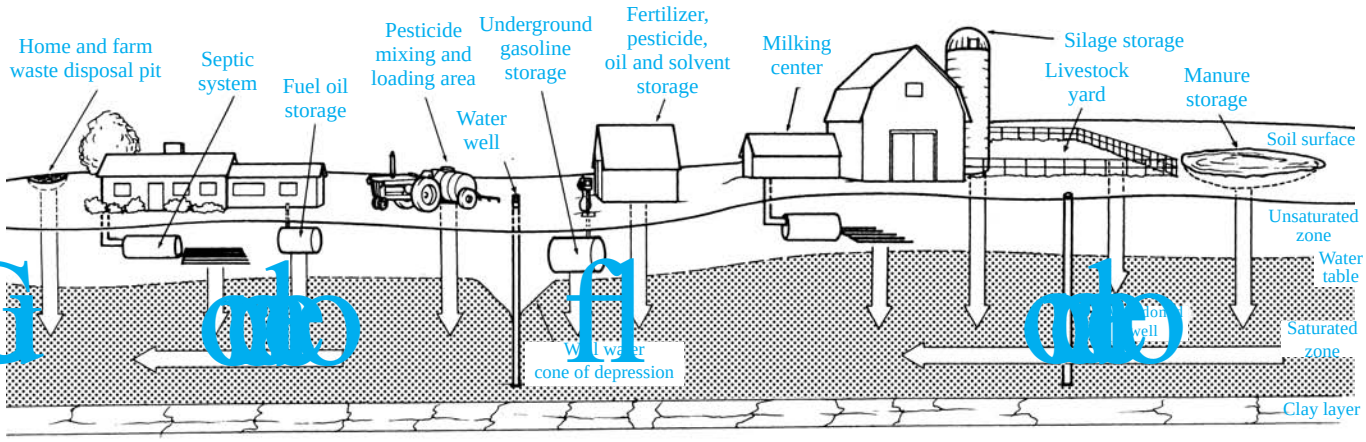


Figure 2: Illustration of possible sources of groundwater contamination. Common to most farmsteads are sources of nitrate contamination such as manure, milking center wastewater and nitrogen fertilizers, which must be properly managed to protect groundwater. Likewise, city dwellers have to consider their animal waste, chemical storage and fertilizers to protect their city water supply.

What's underground? Soil and bedrock type, distance to the water table

Pollutant risks are greater when the **water table** (top of the saturated area) is near the surface because contaminants do not have to travel far to reach the water. Contamination is more likely if soils are thin (a few feet above bedrock) or if they are highly porous (sandy or gravelly). If bedrock below the soil is fractured (has cracks that allow water to seep down rapidly, such as limestone) then groundwater contamination is more likely. Check with neighbors, well logs from your local health department, local farmers or well drilling companies to learn more about what's under your property.

✔ Assessment 1 – Risks Related to Well Location

Use the following assessment to rate your well location risks. For each question about [illegible] "Your best estimate." [illegible] more information to complete the table.

	Low risk/ recommended	Medium risk/ potential hazard	High risk/ unsafe situation	Your risk
Position of well in relation to pollution sources	Well is uphill (upgradient) from all pollution sources. Surface water doesn't reach well or is diverted.	Well level with or uphill from most pollutant sources. Some surface water runoff may reach well.	Well located downhill (downgradient) from pollution sources or in pit or depression. Surface water runoff reaches well.	
Separation distances between private well and pollution sources	Meets or exceeds all state minimum [illegible] 10' - surface [illegible] animal yard, fuel storage 150' - pesticide/fertilizer storage or mixing	Meets minimum distance requirements for some but not all pollution sources.	Does not meet minimum separation distances for most or all potential sources (required to be at least 50 feet from well).	
Soil type	Fine-textured soils such as clay loams and silty clay.	Medium-textured soils, such as loam.	Coarse-textured soils such as sands, sandy loam or gravel.	
Subsurface conditions	Water table deeper than 30 feet.	Water table at 20 to [illegible]	Water table or [illegible] allowing [illegible]	

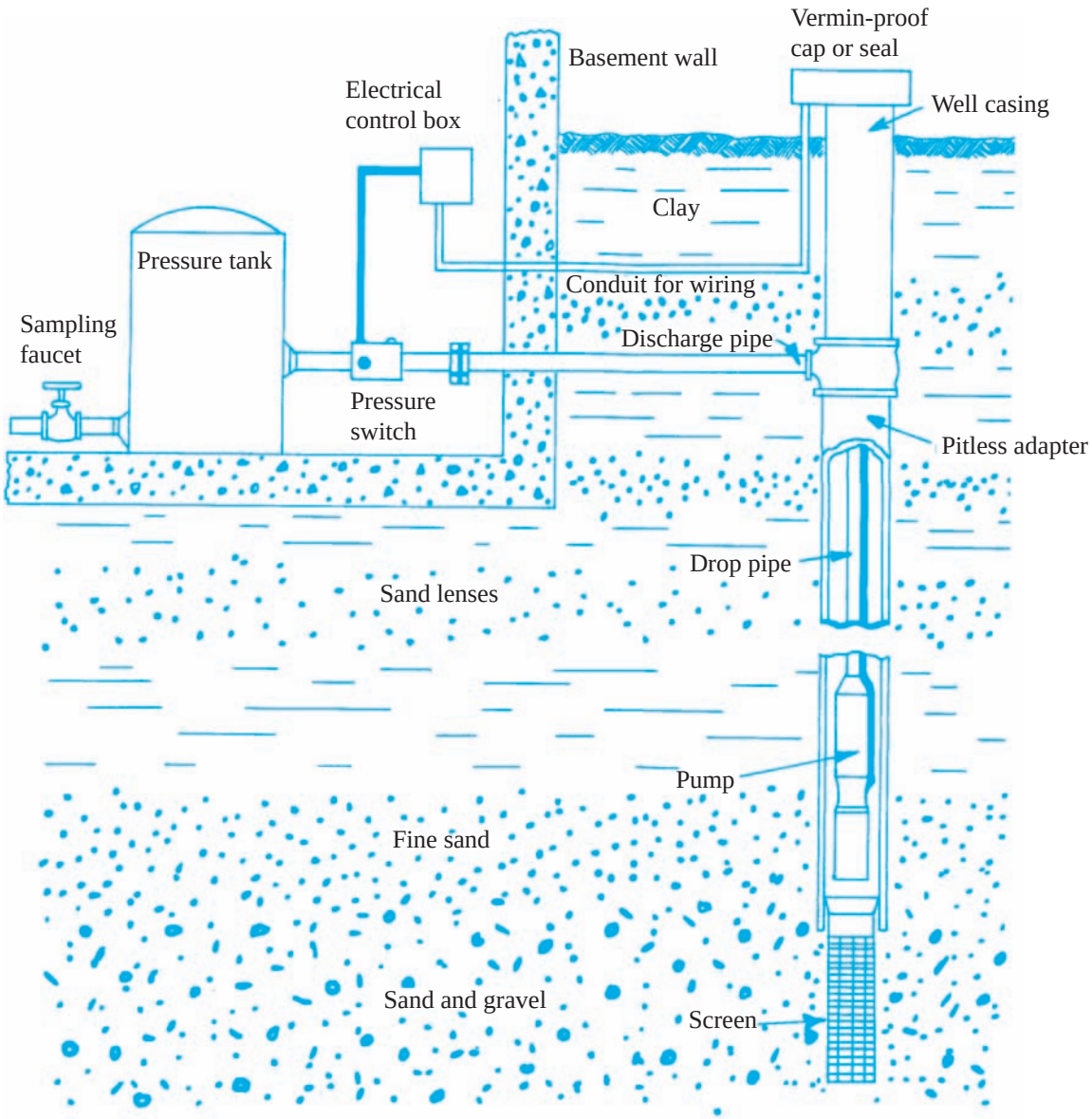
A boxed risk level

Next steps: [illegible] Turn to the checklist at the end of this section and review the recommendations above to help you plan actions to reduce your risks.

Part 2 – Well Construction and Maintenance

Old [illegible] the risk [illegible] water contamination. [illegible] properly [illegible] pesticides

You would [illegible] long without a tune-up or oil change. Your well [illegible] Be sure to [illegible] determine risks related to well design or condition.



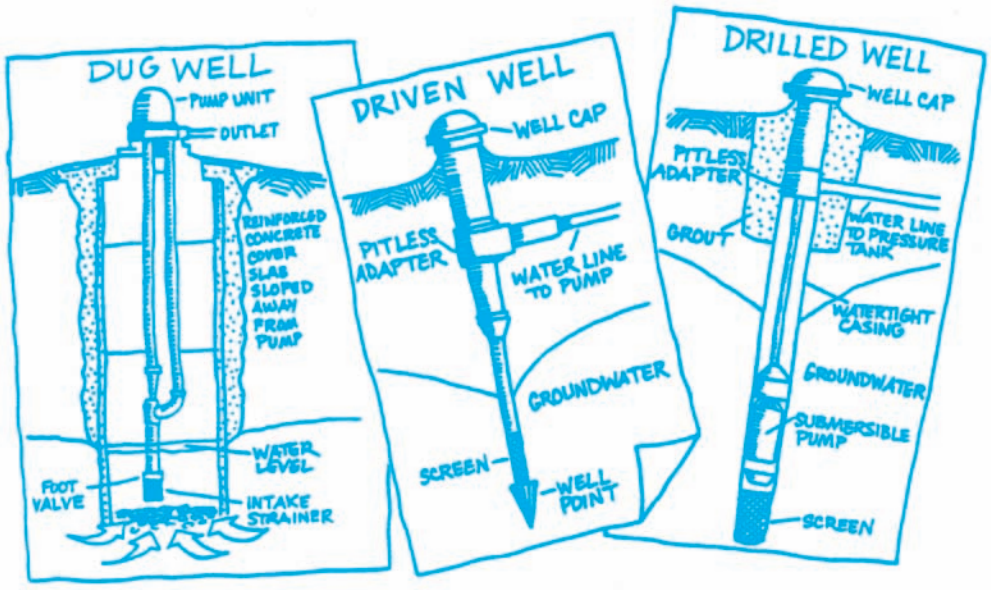
Adapted from "Planning Your Well: Guidelines for Safe, Dependable Drinking Water." University of Illinois-Champaign Cooperative Extension, 1998.

How old is your well?

Well age is an important factor in predicting the likelihood of contamination. Wells constructed more than 70 years ago are likely to be shallow and poorly constructed. Older well pumps are more likely to leak lubricating oils, which can get into the water. Older wells are also more likely to have thinner casings, which may be cracked or corroded. Even wells with modern casings that are 30 to 40 years old are subject to corrosion and perforation. If you have an older well, you may want to have it inspected by a registered well driller.

What type of well do you have?

A **dug well** is a large-diameter hole, usually more than 2 feet wide, and constructed by hand or with a large boring machine. Dug wells are usually shallow and poorly protected from surface water runoff. They pose a high public health and safety risk. **Driven-point (sand point) wells**, which pose a moderate to high risk, are constructed by driving lengths of pipe into the ground. These wells are normally around 2 inches in diameter and less than 50 feet deep and can be installed only in areas with loose soils such as sand. All other types of wells are **drilled wells** which, for residential use, are commonly 4 to 8 inches in diameter.



Are your well casing and well cap protecting your water?

Well drillers install a steel or plastic pipe casing to prevent collapse of the hole after drilling. The space between the casing and the sides of the hole offers a direct channel for water and contaminants—to reach the water table. To prevent this, the space around the casing should be filled with **grout** (cement or a special type of clay called bentonite). Older drilled wells may not be grouted. If your water turns cloudy after a heavy rain or spring thaw, the space surrounding the well casing may have a defective grout seal. You should visually inspect your well casing for holes or cracks or space around the casing. Examine the part that extends from the ground. If you can move the casing around by pushing it, you may have a problem with your well casing's ability to keep out contaminants. Sometimes, damaged casings can be detected by listening for water running down into the well when the pump is not running. If you hear water, there might be a crack or hole in the casing, or your casing may not reach down to the water table. Either situation is risky.

The depth of casing required for your well depends on the depth to [illegible] 2[illegible] feet of [illegible] well [illegible] Older caps have no screen or gasket and have screws going horizontal to the well casing. The cap must be at least 1 foot above the soil surface. Wiring for the pump should be secured in an electric conduit pipe.

Is your well shallow or deep?

As rain and surface water soak into the soil, they may carry pollutants down to the water table. In some places, this process happens quickly—in weeks, days or even hours. Local geologic conditions determine how long this takes. Shallow wells, which draw from groundwater nearest the land surface, are most likely to be affected by local sources of contamination. However, deep wells do not guarantee protection from contamination.

Does your water piping system have backflow prevention?

Back[illegible]w of contaminated water into your [illegible]ater supply can occur from back pressure and/or back-siphonage. This can happen in a public or private water system [illegible] with [illegible] is connected to another [illegible] system [illegible] that [illegible] a [illegible] system [illegible], including [illegible] systems with [illegible] irrigation [illegible] connected to the system. Hose bibbs, with hose connections. This reduces the risk of contaminated water reentering your plumbing from laundry, appliances, sinks, swimming pools, irrigation systems, hot tubs and garden hoses. Inexpensive devices for faucets with hose connections can be purchased from plumbing suppliers. Contact your local plumbing inspector for information on the proper back-siphoning device for your situation.

When was your well last inspected?

Well equipment doesn't last forever. Every 10 to 20 years, your well will require mechanical attention from a registered well driller or pump installer. In addition to water test results, you should keep well construction details as well as the dates and results of maintenance visits for the well and pump. It is important to *keep good records* so you and future owners can follow a good maintenance [illegible] water [illegible] your well [illegible] from [illegible] driller [illegible] from the online Michigan Department of Environmental Quality Scanned Water Well Record Retrieval System (www.deq.state.mi.us/well-logs/). This system contains water well records from 1965 through 1999. Some historic records for wells submitted prior to 1965 may also be available. Newer well records are accessible online at http://wellviewer.rsgis.msu.edu/default.htm.

✔ Assessment 2 – Risks Related to Well Type and Condition

Use the following assessment to evaluate risks related to well type, well casing, and the collection of bacteria. A magnifying glass may be helpful. Refer to the above if you need more information to complete the table.

	Low risk/ recommended	Medium risk/ potential hazard	High risk/ unsafe situation	Your risk
Well age	Less than 20 years old.	20 to 70 years old.	More than 70 years ago.	
Well type	Drilled well.	Driven-point (sand point).	Dug well.	
Casing height above land surface	At least 12 inches above the surface.	At surface or up to 8 inches above.	Casing below surface or in pit or basement.	
Well casing and cap	Grouted, drilled well. No holes or cracks. Cap tightly attached. Cap with gasket and screened vent (vertical screws present).	Driven, ungrouted well. No holes or cracks visible. Cap without gasket or screened vent (horizontal screws present).	Ungrouted drilled or dug well. Holes or cracks in casing visible. Cap loose or missing. Running water can be heard.	
Casing depth	Casing extends more	Casing extends 10 to 10	Casing extends less than	
Backflow prevention	installed on faucets with hose connections. No cross-connections between water supplies.	No cross-connections between water supplies.	devices. Cross-connections between water supplies.	
Well inspection and tune-up	Well in within	Well inspected 10 to 20	Last well inspection unknown, or done over	

A boxed risk level

Respond to Assessment 2

Your goal is to protect your well. Turn to the Action Checklist at the end of recommendations in Part 2 to help you plan actions to reduce your risks.

Part 3 – Water Testing and Unused Wells

Water testing helps you monitor water quality and identify potential risks to your health. Contaminants may enter drinking water from many sources. One important source is old, abandoned wells which, if improperly sealed, may provide a direct route for contaminants to enter groundwater. It is important to identify [illegible] wells and [illegible] assessment to determine water quality risks related to water contaminants and old wells.

When was your water last tested?

At a minimum, your water should be tested each year for the two most common indicators of trouble: coliform bacteria and nitrates. If you haven't had a full-spectrum, comprehensive water test, then you don't know the basic characteristics of your water. A more complete water analysis for a private well will tell you about its hardness, alkalinity, conductivity, iron, nitrate, sodium and chloride content. In addition, you may choose to obtain a broad-scan test of your water quality for other contaminants, such as pesticides. A good source of information is your local health department or even your neighbors. Ask them what their tests have revealed.

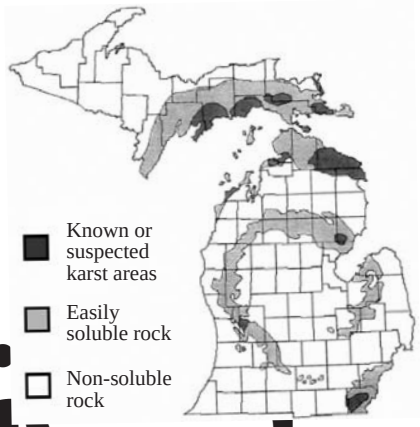


Figure 3: Bedrock areas of concern. *"Understanding Groundwater." Institute of Water Research/Center for Remote Sensing, MSU.*

What contaminants should you look for?

You should test for the contaminants that might be found at your location. For example, if you have lead pipes, soldered copper joints or brass parts in the pump, test for the presence of lead. Test for volatile organic compounds (VOCs) if there is [illegible] a spill [illegible] solvents. Test for nitrate levels—more than 10 milligrams per liter (mg/l) of nitrate-nitrogen (NO_3-N) or 45 mg/l of nitrate (NO_3)—and if pesticides are used routinely in the immediate area. Test also if a pesticide spill has occurred near the well. Pesticides are more likely to be a problem if your well is shallow, has less than 15 feet of casing below the water table, or is located in sandy soil and is downslope from irrigated lands where pesticides are used.

In some areas of Michigan, there are certain concerns to be aware of that may be potential sources of drinking water contamination. Near Alpena, Rogers City, Monroe and parts of the Upper Peninsula in special geographic areas called karsts, the underlying bedrock is made up of carbonate rocks such as limestone (Figure 3). Over time, the rock may dissolve away, creating pathways for contaminants to reach drinking water sources. In other areas, naturally occurring arsenic can be found in groundwater. Southeastern Michigan is one such area (Figure 4).

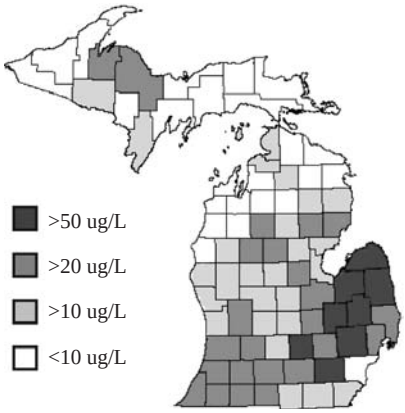


Figure 4: Michigan's groundwater arsenic levels by county. *Michigan Department of Environmental Quality.*

In certain instances—for example, during an emergency when water supplies might have been contaminated with bacteria—local health departments may advise residents to boil water before drinking it. This is often called a boil water advisory. Boiling water is not advised if the water is contaminated with nitrates because boiling it will concentrate the nitrates, making it more harmful

Keep records of these results to monitor water quality over time.

in removing well parts in the casing and soil/rock type. The money spent sealing a well will be a bargain compared with the potential costs of cleanup or the loss of property value if contamination occurs.

to Part 3 above if you need more information to complete the table.

	Low risk/ recommended	Medium risk/ potential hazard	High risk/ unsafe situation	Your risk
Water testing	Water test consistently meets standards for bacteria, nitrate and other contaminants. No change in color, odor, taste or clarity.	Some tests do not meet standards.	No water testing done or results unsatisfactory in meeting standards. Water discolored after rainstorm or during spring melt. Noticeable changes in color, odor and taste.	
Unused wells	No unused wells present or they have	Unused wells not sealed but capped	Unused, unsealed well in poor condition and/or	

A boxed risk level

your risks.

✔ [illegible]

[illegible] this chapter and [illegible]. Pick a target date to 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

Write all high and medium risks here.	What can you do to reduce the risk?	Target date for action:
Example: Water hasn't been tested for 10 years. Smells different than it used to.	Have sample tested. Contact local health department for laboratory test bottles.	One week from today: June 15

Resources

Drinking water quality standards:

Michigan Department of Environmental Quality Drinking Water Bureau
517-355-8184; www.michigan.gov/deq

U.S. Environmental Protection Agency Safe Drinking Water Hotline
1-800-426-4791 (toll-free); www.epa.gov/safewater

National Drinking Water Clearinghouse
www.nesc.wvu.edu/ndwc/ndwc_index.htm

U.S. Geological Survey Michigan Water Science Center
http://mi.water.usgs.gov

Drilling and sealing wells: Contact your local well driller, county health department or the Michigan Department of Environmental Quality Water Bureau (517-241-1413).

Plugging Abandoned Wells. MSU Extension bulletin WQ 40.

[illegible] local conservation district, the county health department or the Groundwater Mapping website (gwmap.rsgis.msu.edu). You can also check this website or with the health department to obtain well logs.

[illegible] testing laboratories.

This chapter was written by Bill McGowan, Agriculture/Water Quality Extension, University of Delaware Cooperative Extension, and adapted for Michigan by Lois Wolfson, Ruth Kline-Robach, Ted Loudon, Roberta Dow and Jim Bardenhagen, Michigan State University Extension. Updated in 2008.

HOME* A*SYST
Home Assessment System

Chapter 11. Managing Household Wastewater: Septic Systems and Other Treatment Methods

This chapter helps you evaluate your septic system and pinpoint risks before they become problems. It provides general guidelines for safe management of household wastewater. Local laws, however, may impose more stringent or additional requirements. For example, some systems—such as [illegible]—may be [illegible]. Usually, contact your [illegible] environmental agencies, or a septic system contractor for advice.

This chapter covers three factors that affect your pollution risks:

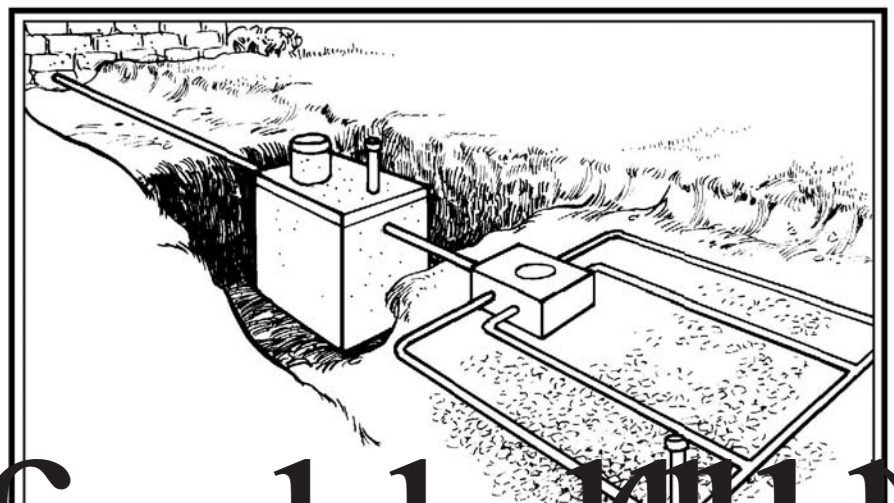
- **1. [illegible]**
  Knowing your septic [illegible] and your system's location.
- **2. [illegible]**
  Pumping your septic [illegible] for signs of trouble.
- **3. Inputs to the system**
  Reducing the amounts of water, solids and harmful chemicals going into your system.

Why should you be concerned?

Wastewater treatment [illegible] drain and out of your house. Disease-causing microbes (pathogens), hazardous chemicals and nutrients such as phosphorus, nitrates and organic wastes found in wastewater can lead to human illness and polluted water. Wastewater must be treated before these contaminants reach groundwater—the source of well water—or nearby lakes, streams or wetlands.

Wastewater treatment is often out of sight and out of mind until problems occur. Learn the basics about your household system and take simple precautions to prevent problems. It's a wise investment to keep your system properly working. Replacing a failed system can cost thousands of dollars. Untreated or poorly treated wastewater can contaminate your drinking water or pollute water resources needed for wildlife, agriculture, industry and recreation.

If you live on or near a lake or stream and would like more information about the special role you play in preventing contamination of your lake or stream by household wastewater, please refer to MSU Extension bulletin WQ-52, "Managing Shoreline Property to Protect Water Quality."



[illegible]

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Are you hooked up to a city or community sewer system?

Even if wastewater is not treated on your property, you can still lessen the impact that your wastewater has on your community and the environment. Conserving water and being careful about what you put into your sinks and toilets are ways you can help. Call your local sewage treatment authority for more information. Using your system wisely saves taxpayers' dollars and protects our water resources.

Do you have a septic system or other on-site system to treat wastewater?

This [illegible] is [illegible] buri[illegible] [illegible] tank followed

The [illegible] [illegible] [illegible] inputs will also apply to [illegible] followed by a mound,

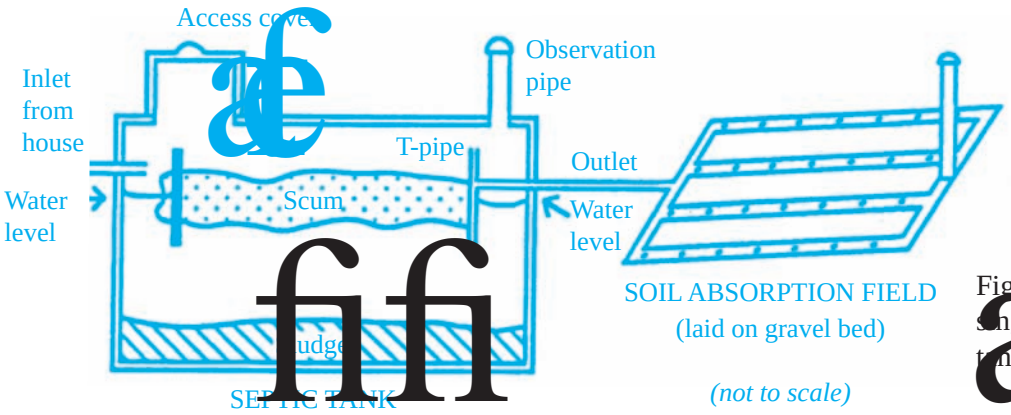


Figure 2: Cross [illegible] single [illegible] tank [illegible]

How does conventional septic system work?

your house and into the **septic tank**, a watertight box [illegible] common [illegible] of concrete or [illegible] material (Figure 2). Today, double-[illegible] plastic [illegible]

top of the [illegible] Heavier solids settle [illegible] **sludge**. [illegible] incoming [illegible] must [illegible] tank and

tank break down some of the sludge into simple nutrients, gas and water. The remaining solids are stored in the tank until they're pumped out.

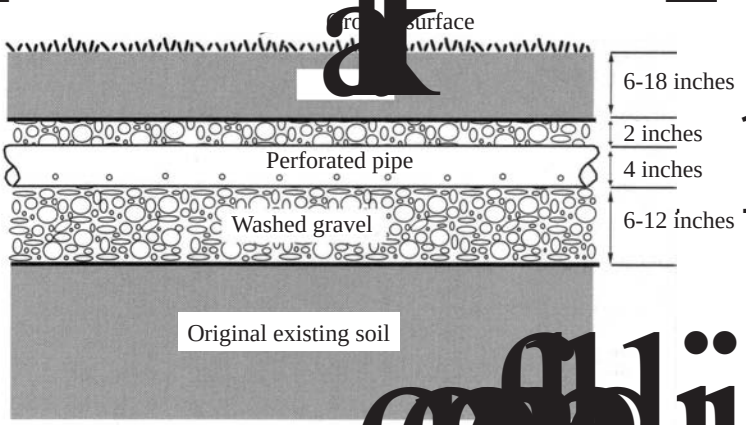
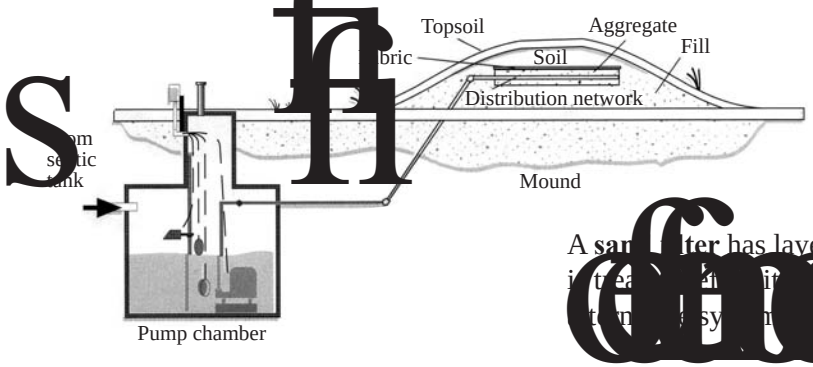


Figure [illegible]

shoreline or stream.

quickly. If the soil is saturated with water, it becomes anaerobic (lacking oxygen). Under anaerobic conditions, bacteria digest waste slowly, unpleasant odors are released, and the septic system can fail.

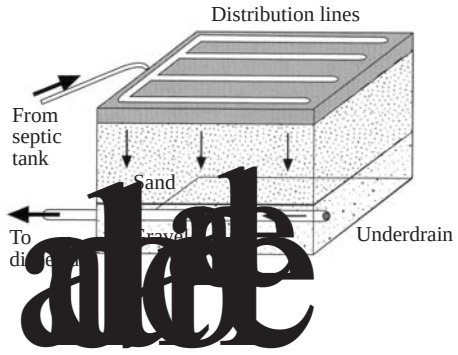


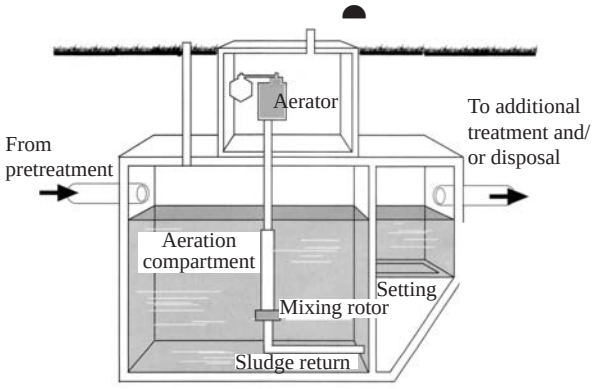
Mound system at grade

system might be used (Figure 4). A **mound system** is built above ground to provide additional soil depth for treatment.

A **sand filter** has layers of sand and gravel in which the wastewater is treated as it trickles through and around the existing soil. These treatment systems may require a pump or siphon to send even doses

Aerobic treatment units mix wastewater with air on surfaces where bacteria can feed on the organic wastes and pathogens. Aerobic tanks are used in place of septic tanks, most often at sites that do not have adequate soil area or depth for effective subsurface wastewater treatment. Holding tanks may be used in temporary situations prior to a new system hookup or at summer residences. In contrast to a septic tank, a holding tank has no outlet and must be pumped frequently to dispose of wastewater.





Aerobic treatment unit

Figure 4: Some alternative treatment systems. *Graphics developed by and reprinted with permission from the National Environmental Services Center, West Virginia University, Morgantown, W. Va.; www.nsfc.wvu.edu.*

Part 1 – Septic System Design and Location

Capacity of the System

toilets and water-saving faucets are installed.

equipped at a minimum with a 1,000-gallon septic tank. More commonly, however, health departments are requiring at least 1,200- or 1,500-gallon tanks. Complete the following exercise to determine whether your septic tank is large enough to

The septic system is stressed when the amount of household wastewater exceeds the system's capacity. For example, additions of water-using appliances such as a garbage disposal, washing machine or dishwasher can greatly increase the wastewater load to your system. Also, if your home was originally built to be a seasonal residence such as a summer cottage but you have converted the home to

safely process your wastewater may be required.

Is your septic tank capacity adequate?

The amount of wastewater generated by the average individual ranges from 50 to 100 gallons per day. Use the following equation to estimate the wastewater generated by your household. Your septic tank capacity should be large enough to hold two days' worth of wastewater.

____ Number of individuals in household x 75 gallons per day x 2 days
= ____ gallons wastewater generated by your home in 2 days.

____ Septic tank capacity (contact health department if you don't have records).
Which is greater?

____ 2-day amount ____ Septic tank capacity

If your 2-day wastewater amount is larger than your septic tank capacity, you need to reduce your wastewater or upgrade your system.

If you do not know the capacity of your system, ask the septic tank installer or pumper, or contact the local health department or the previous owner of your home to obtain information about the septic system.

Age of system

Septic systems are expected to last anywhere from 15 to 40 years, depending on how well they are maintained and if they are appropriately designed for the site. If your tank is made of steel, it will rust and need replacement. The older your system, the more likely that it does not meet the latest standards. Even a relatively new system can fail, however, if it is undersized or not properly located and maintained.

Does your system have an alarm device?

A holding tank or pumping chamber should have an alarm to warn you when the

available on systems with pumps or other electrical components.

Separation distances

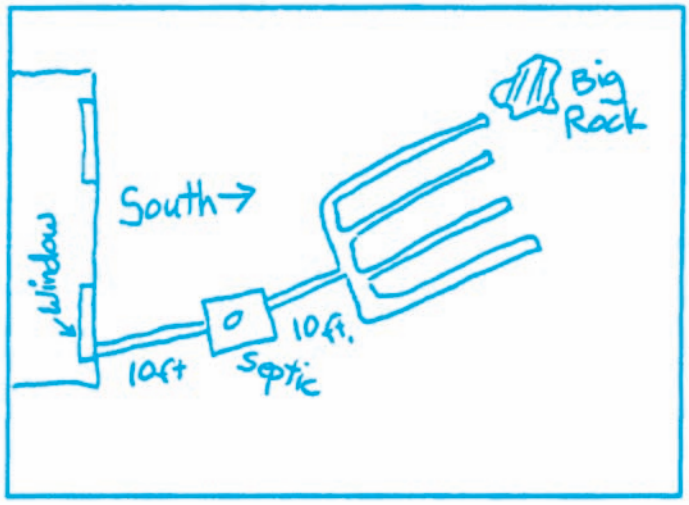
water supply and your neighbor's well. The greater the distance, the lower the

Science and Service Division (see "Resources" at the end of this chapter).

Do you know exactly where your system is located?

To take proper care of a septic system, you must know where it is located. The exact locations of septic system components are not obvious because they are

house and noting the direction in which it goes through the wall. Your tank is usually 10 to 20 feet away from the house in that direction.



Draw a map of your system. *National Environmental Services Center.*

✔ Assessment 1 – Risks Related to Septic System Design and Location

Use the following assessment questions to identify pollution risks. For each question, put your check (✔) in the low, medium or high risk column labeled

	Low risk/ recommended	Medium risk/ potential hazard	High risk/ unsafe practice	Your risk
Capacity of system	designed to handle more wastewater than required for the number of residents.	Capacity just meets wastewater requirements.	wastewater greater than current capacity of system.	
Age of system (includes holding tank)	Less than 5 years old.	Between 6 and 20 years old.	System more than 20 years old.	
Safety devices			No	
Separation distances			0 fe	

A boxed risk level

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recommendations in this chapter to help you make plans to reduce your risks.

Part 2 – Septic System Maintenance

What about pumping and inspection?

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By design, holding tanks must be pumped because they have no outlet. Depending on household size and tank capacity, you may need to have your tank pumped every year or more often.

Do you know when your tank was last pumped?

Keeping good records each time your septic system is pumped, inspected or repaired will help you make cost-effective maintenance decisions (Table 1). This information will also be valuable if you sell or transfer your property.

Table 1. Keep a septic system maintenance record.

Date	Work done	Performed by

Table 2. Years between pumpings.

Find your tank size (in gallons) and the number of people in your household. Go across the row to the column for the number of people in your household. Where the row and column meet is the *number of years between pumpings.*

Example: if you have two people in your household and a 1,000-gallon tank, with average use and no garbage disposal, you would need to pump the tank approximately every 5.5 years.

Tank size (gallons)	Number of people in your household					
	1	2	3	4	5	6
500	5.5	2.5	1.5	1	.5	.5
1000	12	5.5	3.5	2.5	2	1.5
1500	18.5	9	5.5	4	3	2.5
2000	25	12	8	5.5	4.5	3.5

How can I prevent problems?

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What are the signs of trouble?

- Foul odors in your home or yard will tell you that your system is not working
- by a clog in the house pipes, septic
- nt growth may appear near a leaky septic
- Repeated intestinal illness in your family may occur if your water is contaminated by poorly treated wastewater. Have your drinking water tested annually for coliform bacteria and nitrates. (See Chapter 10.)
- Algal blooms and excessive weed growth in nearby ponds or lakes can be caused by excess phosphorus or nitrogen from septic systems.

Respond quickly to any problems you observe. You may need to expand or modify your system to avoid further problems. Contact your local health department before making changes. Many good publications and other resources are available. If you see "
" or "
" at the entrance to a chapter, a local contractor or a
on the environment and your health. Remember, what may seem to be the least expensive option may not be economical in the long run.

How should I dispose of the discharge from my water softening system?

Check with your local health department to identify which of the following is the best option for your site:

a. Dispose of water softener discharge via a subsurface perforated pipe in a stone trench.
b. Direct the discharge on the surface of the ground away from the septic system.
Note: this method may result in vegetation being killed from the salinity of the liquid.
c. Connect the discharge to a dry well that is separate from the septic system.

✔ Assessment 2 – Risks Related to Septic System Maintenance

Use the following table to evaluate your septic system maintenance practices. Answer each question by circling the low, medium or high risk column that applies. Circle "?" if you need more information to complete the table.

	Low risk/ recommended	Medium risk/ potential risk	High risk/ unsafe situation	Your risk
Tank pumping and inspection (includes holding tanks)	Septic tank pumped and visually inspected on a regular basis—every 3 to 5 years (or as needed), and holding tanks pumped as needed.	Septic tank pumped but not regularly or as needed. Tank not checked between pumpings.	Septic tank not pumped. Condition of tank not known between pumpings.	
Drainfield protection	Vehicles and other heavy objects kept off drainfield area. No deep-rooted trees or shrubs in drainfield.		Vehicles, livestock, heavy objects or other disturbances permitted in area.	
Signs of trouble	No sewage backup in house or odors in basement. Drainfield not wet. Well water tests negative for coliform bacteria.	Occasional sewage backup in house. Drainfield wet.	Frequent sewage backup in house. Sewage odors in basement. Drainfield wet. Well water tests positive for coliform bacteria.	
Map and records	Good map with house well and septic tank location and distances, plus records of system maintenance are kept.	No map or incomplete records.	No map or maintenance records kept.	

A boxed risk level

Review your risk assessment. Identify any high risk practices that you circled. Read the recommendations in this section to help you make plans to reduce your risks.

Part 3 – Septic System Inputs

What solid wastes are acceptable?

Your septic system is not a substitute for the trash can or a compost pile. Disposal of tissues, paper towels, sanitary napkins, cigarette butts and other solid wastes in a septic system can clog the soil absorption field. Do not put garbage and *never* dump toilet paper materials (not even a garbage disposal in the kitchen sink—it adds to the load in your system. Excess grease, oils and coffee grounds can clog your system. Consider composting food waste and even some paper wastes as an alternative.

What household chemicals can go down the drain?

Wastewater treatment systems are not designed to neutralize the wide variety of household chemicals used. Paints, solvents, oils and pesticides can pass untreated through your system. See the product disposal assessment in Chapter 3, "Managing Hazardous Household Products," for information on proper disposal of hazardous chemicals.

Septic system additives are unnecessary. If a septic system is functioning properly, the optimal bacterial action is already taking place. If a septic system is failing, additives will not correct a failing system.

What is a

microbes at work in the system. There are many steps you can take to reduce water use. See Chapter 8, "Conserving Water around Your Home."

✔ Assessment 3 – Risks Related to Septic System Inputs

you need more information to complete this assessment.

Risk

recommendations in this section to help you make plans to reduce your risks.

	Low risk/ recommended	Medium risk/ potential risk	High risk/ unsafe situation	Your risk
Solid wastes	No garbage disposal in the kitchen. No grease, oils or coffee grounds down the drain. Only toilet tissue in toilet.	Moderate use of garbage grinder and use of sink for disposal of some solids.	Heavy use of garbage grinder and disposal of many solids. Many solids down the toilet.	
Cleaners, solvents and other chemicals (also applies to holding tanks)	Moderate use of cleaning products that end up in wastewater. Hazardous chemicals never poured down drain or toilet.	Moderate use of cleaning products that end up in wastewater. Small amounts of hazardous chemicals poured down drain or toilet.	Heavy use of cleaning products that end up in wastewater. Wastewater used to dispose of hazardous chemicals.	
Water conservation	Water conserving use. Drip-free faucets,	Some water-conserving shower heads, fully loaded washing machine	No water-conserving practices. Inefficient standard bathroom fixtures, shower [illegible] aired	
A boxed risk level				

✔ Action Checklist

Circle the items listed above and other items you identified as medium or high risks. Write down the improvements you plan to make. Use recommendations from this chapter and other resources to decide on actions you are likely to complete. A target date helps you follow through on the change. You don't have to do everything at once, but try to eliminate high priority risks as soon as you can. Often it helps to

Write all high and medium risks here.	What can you do to reduce the risk?	Target date for action:
Example: Area over drainfield is always wet.	Have drainfield inspected for blockages and cleaned as needed. Divert surface runoff.	One week from today: May 15

Resources

Drilling and sealing wells: Contact your county or regional health department or local well drillers, or the Michigan Department of Environmental Quality at 517-241-1413.

Drinking water quality standards. Call the Michigan DEQ, 517-355-8184, or the U.S. Environmental Protection Agency Safe Drinking Water Hotline toll-free, 1-800-426-4791.

Groundwater and geology: Contact the U.S. Geological Survey, 517-887-8903; the Department of Environmental Quality Geological Survey, 517-241-1515; the local conservation district or your county health department.

Septage handlers: For a directory, go to www.deq.state.mi.us/shr.

Septic system installers and pumpers: For a listing by state of professional pumpers, installers, inspectors and tank manufacturers in the United States, including septic system information: www.septicyellowpages.com

[illegible]

laboratories at www.deq.state.mi.us/labs.

Publications

"Managing Your Septic System." MSU Extension bulletin WQ39

"[illegible] Pro[illegible]" MSU Extension Bulletin WQ-5[illegible]

Educational Materials Distribution Center:
www.emdc.msue.msu.edu

National Small Flows Clearinghouse:
www.nesc.wvu.edu/nsfc

U.S. Environmental Protection Agency Septic (Onsite) Systems:
www.epa.gov/owm/septic
Click on "Tools and Resources," then "Homeowner."

"A Homeowner's Guide to Septic Systems." EPA-832-B-02-005.
U.S. EPA Publications Clearinghouse: 1-800-490-9198.

This Home*A*Syst chapter does not cover all potential issues related to [illegible]. Other assessments [illegible] MSU Extension publications address important environmental concerns.

This chapter was written by Barbara Kneen, Cornell University Extension, and adapted for Michigan by Eckhart Dersch, Ted Loudon, Roberta Dow and Jim Bardenhagen, Michigan State University Extension. Updated in 2008.

HOME*A*SYST
Home Assessment System

Chapter 12. Managing Liquid Fuels Safely: Gasoline, Heating Oil, Diesel and Other Fuels

This chapter helps you identify potential risks to the environment and to your family's health related to the way 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 chapter applies to you:

- Lawnmower
- Snowmobile
- Motorcycle
- Weed trimmer
- Motorboat
- Auxiliary generator
- Snowblower
- Chainsaw
- Campstove
- Yard [illegible]lower
- Spa[illegible] heater

2. Large fuel tanks

This section is for homeowners with aboveground, basement or underground fuel tanks in use or inactive on their property. It examines:

- Tank location
- Tank management
- Removal and abandonment

It applies to non-business tanks that hold less than 1,100 gallons. Larger tanks or those used for business purposes [illegible] gases such as liquid propane (LP) and liquid natural gas.

Michigan Groundwater Stewardship Program

MICHIGAN STATE UNIVERSITY EXTENSION

Why should you be concerned?

The proper storage of gasoline, heating oil and other fuels on your property is often overlooked. 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 1 to 5 gallons. For home heating and vehicle use, you also may have larger quantities of fuel kept in underground, basement or above-ground 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 1 gallon of gasoline can quickly contaminate groundwater above 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 to fuel in your drinking water. Leaks can come from unexpected sources. Unknown or forgotten underground tanks have come to haunt property owners.

[illegible] underground and explode.

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

This chapter can help you evaluate how you manage liquid fuels, identify areas of risk (Figure 1), 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.

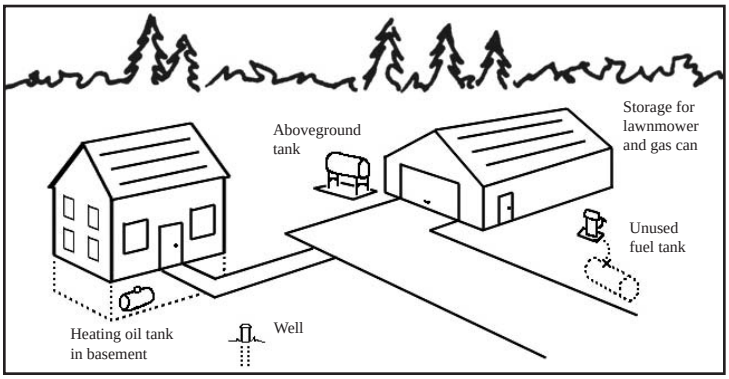


Figure 1: Areas of fuel contamination risk at the homesite.

✔ Part 1 – Portable Fuel Containers for Handling Small Quantities of Fuel

How much fuel do you buy and use?

It is best to purchase and store minimal 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 left over fuel at the end of a season? [illegible] use these up [illegible] for example, for new fuel to protect your engine. Beware of oil-blended fuels, which should be used only in engines designed for these fuels. Extra gas left in equipment at the end of a season should be drained and used elsewhere. Fuel stabilizers may extend the shelf life of fuels.

UL-approved containers

Fuel	Container color
Gas	Red
Kerosene	Blue
Diesel	Yellow

Do you store fuels in approved containers?

It is important to use only safe, approved containers to store fuels. UL-approved containers (red for gasoline, blue for kerosene, and yellow for diesel) can be purchased in [illegible] Each container should be clearly labeled to identify [illegible] pouring without spilling. Storing fuels in uncovered or non-approved containers is dangerous. For an extra measure of spill protection, fuel containers can be kept inside a tub or other container that would prevent leaks from spreading (secondary containment).

Do not use glass jars, milk jugs or other non-approved containers.

Are fuels stored or kept in a way that [illegible]

[illegible] children [illegible] container [illegible] could go down the drain. Further liquids could drive the contamination down to your groundwater.

Do you check on your fuels or machinery regularly?

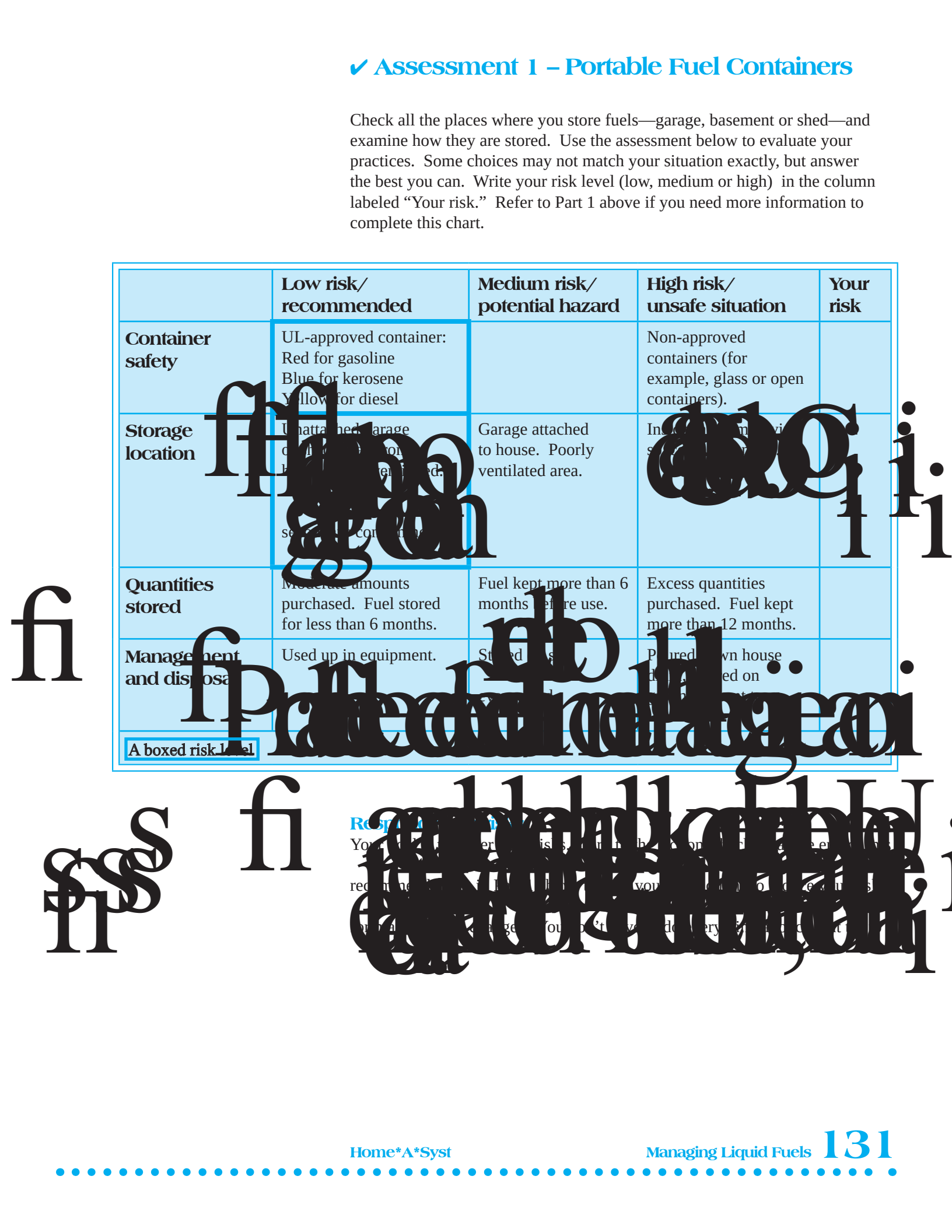
Periodically check for leaks from storage containers and fuel-driven devices, especially if they have not been used for some time. A small leak can add up over time. You can keep on top of things with regular inspection and maintenance. Always recycle or safely dispose of engine maintenance products. (See Chapter 3, "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 assessment below to evaluate your practices. Some choices may not match your situation exactly, but answer the best you can. Write your risk level (low, medium or high) in the column labeled "Your risk." Refer to Part 1 above if you need more information to complete this chart.

	Low risk/ recommended	Medium risk/ potential hazard	High risk/ unsafe situation	Your risk
Container safety	UL-approved container: Red for gasoline Blue for kerosene Yellow for diesel		Non-approved containers (for example, glass or open containers).	
Storage location	Unattached garage	Garage attached to house. Poorly ventilated area.		
Quantities stored	Moderate amounts purchased. Fuel stored for less than 6 months.	Fuel kept more than 6 months before use.	Excess quantities purchased. Fuel kept more than 12 months.	
Management and disposal	Used up in equipment.			
A boxed risk level				

Recommendations



Part 2 – Large Fuel Tanks (Aboveground, Underground and Basement Storage Tanks)

It is vital to know about fuel storage tanks on your property, both tanks in use and abandoned tanks. Many laws and regulations restrict the use of these tanks and make property owners responsible for damages caused by tanks, even if they were unaware of the tank's existence. Standard homeowner's insurance does not typically cover the costly cleanups.

Part 2a – Tank location

This section covers aboveground, basement and underground tanks. Answer only those questions that apply to you. Remember to assess each tank separately.

Storage tanks located in basements with drains provide a high risk for fuel spills. Tanks in basements with floor drains are not recommended.

Tank registration information:
Most tanks larger than 1,000 gallons or for business use need to be registered with:

Michigan Department of Environmental Quality (DEQ)
Waste & Hazardous Materials Division
Storage Tank Program
517-335-2690
deq-std-tanks@michigan.gov

DEQ Storage Tank Information Center:
www.deq.state.mi.us/sid-web

Homeowners sometimes place fuel oil tanks too close to their home. Placement under the eaves has resulted in falling ice damage to tanks, causing fuel loss and environmental cleanup costs. Tanks need to be stably mounted and placed away from risk of vehicular or other impact. The type of tank and fuel will determine the allowed placement distance from buildings. Check with the DEQ before placing your tank.

How far should a tank be from a well?
Fifty feet is the minimum distance required between tanks and wells. Certain soil types—such as sandy soils—allow pollutants to seep more rapidly into groundwater. The 50-foot minimum also applies to the distance between tanks and streams, wetlands, ponds and other surface waters.

For each high-risk tank, consider removing it 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 with secondary containment should be chosen. Never try to convert an underground tank into an aboveground tank or vice versa. For professional assistance, look in the yellow pages under "Tanks," "Environmental," "Engineers" or "Testing." Contact the Michigan Department of Environmental Quality (DEQ) for assistance in testing. If it is possible to remove high-risk tanks, be extra careful to monitor them for spills and leaks.

What is the distance to the water table?

In most places, if you dig straight down, you will eventually reach water. This water table may be a few feet to more than 50 feet down. This distance is important for several reasons. When water is close to the surface, there is a good chance that it will come into contact with the steel walls of an underground tank. In wet conditions, metal is more likely to corrode, particularly [illegible]. [illegible] reach the groundwater [illegible] is close to the surface, your tank

[illegible]

department or well driller or the Michigan Groundwater Stewardship Program. 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 removing it. The cost of removing it and installing an aboveground tank may be far less than paying for a future cleanup.

✔ Assessment 2a – 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 your 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 wise to check for inactive underground tanks.

Evaluate your situation using the assessment below. Write your risk level (low, medium or high) in the column labeled "Your risk." Refer to Part 2a above if you need more information.

	Low risk/ recommended	Medium risk/ potential hazard	High risk/ unsafe situation	Your risk
Distance from your well	Greater than 100 feet from private water well.	Between 50 and 100 feet from private water well.	Less than 50 feet from private water well.	
Distance from surface water	Greater than 100 feet from wetland, stream, river, pond or lake.	Between 50 and 100 feet from wetland, stream, river, pond or lake.	Less than 50 feet from wetland, stream, river, pond or lake.	
Water table level	Water table (distance to groundwater) consistently more [illegible] surface	Water table consistently between 5 and 10 feet below the surface.	Water table consistently less than 5 feet below the surface	
A boxed risk level				

[illegible]

Continued on next page...

...Assessment 2a continued

	Low risk/ recommended	Medium risk/ potential hazard	High risk/ unsafe situation	Your risk
Basement tank location	In [illegible] or with a closed drain, or tank has secondary containment (double-walled tank, pan or dike).		[illegible] secondary containment for tank.	
Distance from building	Fuel oil tank located 5 or more feet from building. Aboveground gas or diesel single-walled tanks for motor vehicle fueling 40 or more feet from [illegible] ground [illegible] feet from building.		Fuel oil tank closer than 5 feet, gas or diesel single-walled tank closer than 40 feet or underground tank closer than 10 feet to building.	
A boxed risk level				

Responding: Turn to the action list at the end of this chapter to complete your actions to reduce your risks.

Part 2b – 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. Aboveground tanks should be stably mounted and situated so that the tank itself is not in contact with the ground and thus not as prone to corrosion and leaking. Buried tanks more than 15 years old have a dramatically higher chance of leaking than newer tanks. Underground steel tanks now must have corrosion protection. It is expensive to put corrosion protection on existing tanks—it may be more cost-effective to replace them. Even new tanks and piping can leak, especially if they were incorrectly installed.

Underground steel tanks must have corrosion protection such as interior tank liners, protective coatings on the tank exterior and cathodic (electrochemical) protection. Fiberglass tanks do not corrode but are vulnerable to ground heaving and installation damage.

Leak detection for underground storage tanks is complicated but 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.

Have you checked all pipes and connections?

Pipes and connections are frequent sources 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 are your keys to avoiding problems.

What signs of trouble should you look for?

Environmental changes. Your senses—sight, smell and taste—are important for leak detection. Is there an unexplained oil-like substance on lakes or streams? Is nearby soil stained with petroleum due to spillage (Figure 2)? Is the [illegible] drinking water? Have you seen an area of dead plants or an area where plants don't grow near your petroleum storage? Normally you can see leaks from an aboveground tank, but you should be aware of leaks in areas you cannot easily see, such as the tank [illegible] the [illegible]. *Mechanical changes.* Has the [illegible] or changing pump operation. Does it take too long before dispensing? These may be signs of leaks or damage to the piping.

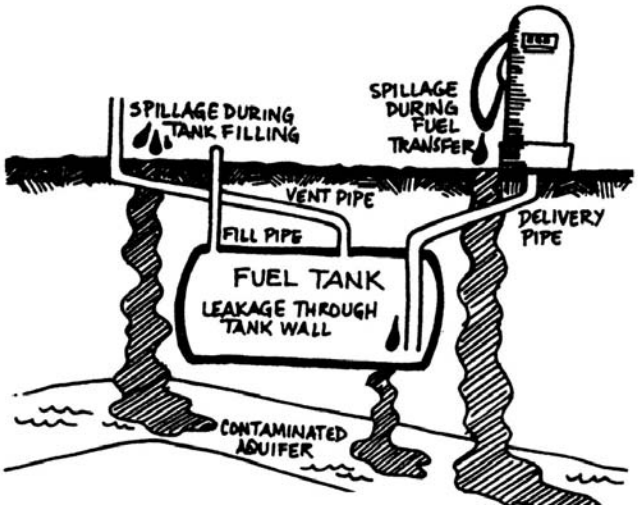


Figure 2: Contamination of groundwater due to improper fuel storage and transfer.

Have you pressure-tested your tank?

Tightness testing (tank and pipe testing) involves placing the tank, piping and contents under pressure and checking for leaks. Many tank owners choose to remove their underground tanks rather than do this testing because it is expensive.

Whom to call

For more information on leak detection systems and for names of approved tank testing methods and suppliers, contact the Michigan Department of Environmental Quality Storage Tanks Program at 517-335-2690 or deq-std-tanks@michigan.gov.

Do you keep track of fuel levels in the tank?

A less expensive way to check for leaks is to monitor the level of fuel over time. Measure precisely the amount of fuel in the tank each month and compare with 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.

What should you do if there is a spill?

Fuel should be done on an impermeable surface. Never hose down a spill. Use absorbent pads or granular absorbent material to soak up the spill. Dispose of the absorbent material properly.

A concrete pad under an aboveground tank will allow you quickly to stop leaks or spills and allow for cleanup. Double-walled aboveground tanks are available that provide protection against leaks. Keep a spill kit handy for equipment fueling spills. See Chapter 9, "Caring for the Yard and Garden," for a sample spill kit.

Is your fuel secure from theft?

Prevent access to fuel and dispensers. Keep the area well lit at night and use a pollution-resistant, locked cap on the fill pipe. Lock the dispenser. Enclosing an aboveground tank with a 6-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 on footings made of cement blocks or concrete that resist changes in soil moisture and frost heaving. In your basement, do not store anything around the tank that is heavy or sharp enough to puncture it. A tank that is located outdoors, exposed to vehicles, should have ventilated barriers around it is recommended.

✔ Assessment 2b – Tank Management

Evaluate your situation using the assessment below. Write your risk level (low, medium or high) in the column labeled "Your risk." Refer to Part 2b if you need more information.

	Low risk/ recommended	Medium risk/ potential hazard	High risk/ unsafe situation	Your risk
Age of your underground tank (gasoline, diesel or heating oil)	Metal underground tank less than 15 years old and protected from corrosion,	Metal underground tank less than 15 years old and not protected from corrosion.	Metal underground tank more than 15 years old.	
Leak detection procedures (underground tanks)	Regular tank tightness testing and monthly fuel use accounting.	Fuel use accounting.	No testing or fuel use accounting.	
Tank leak detection (aboveground tank)	Tank regularly monitored for leaks. Tank on impermeable surface.	Tank regularly monitored for leaks. Tank not on an impermeable surface.	Tank not regularly monitored.	
Spill and overfill protection (for gasoline or diesel)	Automatic shutoff or close supervision during fueling. Fueling on impermeable surface.	Automatic shutoff or close supervision but no impermeable surface.	No automatic shutoff and fueling. No impermeable surface.	
Tank security (for gasoline or diesel)	Fill opening and pump or dispenser (if present) locked.	Fill opening and pump or dispenser lockable.	No locks present. Equipment unlockable.	
Damage protection (aboveground and basement tanks)	Tanks and pumps stably mounted on concrete or metal supports. Protected from impact damage.	Tanks and pumps stably mounted off the ground but no protection from impact damage.	Tanks in contact with the ground or on poor footings. Tanks vulnerable to vehicles or other damage.	
Spill kit	Spill kit for fuel		No spill kit available.	
A boxed risk level				

Responding to risks

Use the Action Checklist on page 139 to record your medium and high risks. Plan and take actions to reduce your risks.

Part 2 – Tank removal and abandoned tanks

of forgotten tanks. Former owners of the property, neighbors or local fuel suppliers may be able to help locate old tanks.

Signs of an underground tank

- Vent pipe (commonly 1-inch diameter) sticking out of ground.
- Fill pipe, usually 2-inch diameter, with screw top (may be missing) or tilt top.
- Mounded or sunken soil of somewhat rectangular shape.
- Site where plants don't grow.
- Site with darkened soil.
- Site showing change in texture suggesting hole dug for tank placement.
- Fuel line leading out from house wall to unseen tank.
-

What should you do with an abandoned tank?

Inactive tanks remain an environmental threat until they are emptied and removed. Underground tanks are a special problem because their corrosion and leakage cannot be seen. Even when a tank is thought to be empty there is often sludge in the tank that cannot be seen. All of the underground piping

left in place.

What if contamination is discovered?

Tank owners may discover leaks when a tank is removed. Soil around and under tanks should be checked for signs of contamination. Stains or odors in soil may indicate a problem. If you suspect contamination, a more thorough assessment

contact the Michigan Department of Environmental Quality Remediation and Redevelopment Division at 517-373-9837 for advice.

was found, detailed records of the resulting site examination.

✔ Assessment 2c – Abandoned Tanks

If you have an abandoned or unused tank, evaluate your situation in the following assessment. Write your risk level (low, medium or high) in the column labeled "Your risk." Refer to Part 2c if you need more information.

	Low risk/ recommended	Medium risk/ potential hazard	High risk/ unsafe situation	Your risk
Tank removed or left in place?	Inactive aboveground tank removed from site or environmentally cleaned and secured. Any spillage of material in underground tank removed. Soil under tank material if too close to building to be removed.		Inactive tank abandoned and left underground (or aboveground).	
Inspected for contamination?	Tank site checked for contamination of soil and groundwater. If the spill or leak [illegible] and tested required.		Site not checked for contamination.	
A boxed risk level				

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

below. For each of these risks, write down the improvements you plan to make. To help you decide what to do, use [illegible] from the assessment. Set a target date that will help you schedule your actions. You don't have to do everything at once, but try to eliminate

Write all high and medium risks here.	What can you do to reduce the risk?	Target date for actions:
Example: *Gas for lawnmower stored in a glass jug.*	*Buy a UL-approved container from the hardware store.*	*One week from today: May 15.*

Resources

- **"H[illegible]"** [illegible] Michigan State Uni[illegible] from County MSU [illegible]

- **"Home Heating Oil Tanks."** Brochure available from Department of Environmental Quality Environmental Assistance Center, 1-800-662-9278, or www.michigan.gov/DEQwhmd. Go to "storage tank" link, then "underground storage tank," then "home heating oil tanks," then "FAQ home heating oil tanks" for a PDF version of the brochure.

- **"[illegible]"** [illegible]

www.dleg.state.mi.us/sidsweb/gc_search.aspx

Spills – [illegible]

Storage – Contact:
DEQ Waste and Hazardous Materials Division Storage Tank Program, 517-335-2690 or deq-std-tanks@michigan.gov.

U.S. [illegible]

EPA510B00001. National Service Center for Environmental Publications, 1-800-621-8431 or go to www.epa.gov/nscep.

This [illegible] to fuel on a variety of topics here, homeowners examine and address their most important environmental concerns.

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