

# Citizen's Guide to the Michigan Wellhead Protection Program



Adopted from  
Michigan Rural Water Association's  
Source Water Protection Program Article Series

1.4

## THE MICHIGAN WELLHEAD PROTECTION PROGRAM: PROTECTING YOUR DRINKING WATER

### THE IMPORTANCE OF GROUNDWATER

In the United States, groundwater is the source of drinking water for half of the total population and 95% of the rural population. Groundwater is also used for raising livestock, agriculture, and industry. Within Michigan, approximately 50% of the population relies on groundwater to supply their drinking water needs. Community drinking water systems are at risk from many possible contamination sources and no community wants to face the loss of its drinking water.

In an effort to protect this valuable resource, the State of Michigan established the Michigan Wellhead Protection Program (WHPP). This program is a voluntary program for communities that use groundwater to supply their wells.



### WHAT IS THE WELLHEAD PROTECTION PROGRAM?

First, it is important to determine the area which contributes groundwater to the public water wells. Communities will hire a consulting firm to do a thorough review of the groundwater that is supplying the drinking water wells. This study will determine how fast the groundwater is flowing and in what direction the groundwater is flowing. This area is called the Wellhead Protection Area (WHPA). At the edge of this area, it would take ten years for contamination to reach the community wells. This is the area that communities will manage and protect. Steps to manage and protect this area include:

1. **ESTABLISH A TEAM.** Identify people that play an important role in groundwater protection. Examples include managers, water superintendents, zoning administrators, teachers, fire department officials, business leaders, farmers and residents.
2. **CONTAMINANT SOURCE INVENTORY.** Identify known and potential sites of contamination within the WHPA and include in a contaminant source inventory list and map.
3. **MANAGEMENT STRATEGIES.** Provide mechanisms that will reduce the risk of contamination. Examples include plugging abandoned wells and implementing zoning ordinances.
4. **CONTINGENCY PLANNING.** Develop a contingency plan in case of a water emergency.
5. **PLAN FOR NEW WELLS.** Provide information on existing groundwater availability, the need for new wells and the vulnerability of the existing wells to contamination.
6. **PUBLIC EDUCATION.** Educate the public about drinking water protection through brochures, placemats, presentations, newsletters and other educational activities.

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1.1

## WATER SPECIFICS: WHERE DOES YOUR DRINKING WATER COME FROM?

### WHAT IS WATER?

Water is an odorless, tasteless, colorless liquid made up of hydrogen and oxygen. Water is a necessary component of human survival and is a vital part of Michigan's economy. In fact, Michigan is home to approximately 20% of Earth's usable fresh water. There are two types of water – groundwater and surface water:

**Groundwater** is water that is underground in cracks and spaces in the soil, sand and rocks.

**Surface Water** is water that is above the surface of the land (i.e. lakes, rivers, streams).

### WHAT IS THE WATER CYCLE?

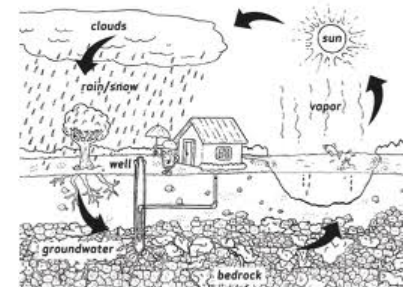
Water moves through a continuous cycle known as the Water Cycle. The Water Cycle is the path that water takes through its various states as it moves throughout the atmosphere.

*First*, a vapor becomes a liquid through **condensation**.

*Second*, the liquid (rain, snow, sleet) falls to the ground through **precipitation**.

*Third*, the water either seeps into the ground, forming groundwater, or it runs off the surface of the land, forming surface water.

*Finally*, the liquid converts back into a vapor and evaporates up into the atmosphere through **evaporation**.



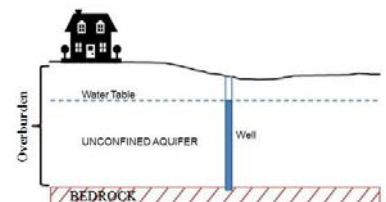
US EPA

### WHAT IS GROUNDWATER?

Groundwater fills the small spaces between rock particles (sand, gravel, etc.) or cracks in solid rock. Rain, melting snow, or surface water becomes groundwater by seeping into the ground and filling these spaces. An aquifer is any type of geologic material, such as sand or sandstone, which can supply water to wells or springs.

Groundwater, which supplies wells, often comes from within a short distance (a few miles) of the well. How fast the groundwater moves depends on how much the well is pumped and what type of rock particles or bedrock it is moving through.

Typical Cross-Section of Soil, Groundwater and Bedrock



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## PROTECT YOUR DRINKING WATER: LAWN AND GARDEN MAINTENANCE

### WHAT IS THE MOST COMMON MISTAKE IN LAWN CARE?

We pamper our lawns and gardens. Over-application of fertilizers, pesticides and herbicides waste money, destroy plants, and pollute water. Lawns that are mowed too short develop weak root systems and require frequent watering and maintenance. Removing grass clippings starve the soil of beneficial nutrients and the organic matter necessary to prevent soil compaction.

### LAWN CARE TIPS

#### **MOW HIGH**

- Mowing high is cheaper and easier to maintain.
- Taller grass...
  - gets more sun so it is better able to make its own food and does not need as much fertilizer.
  - tolerates hot and dry conditions better.
  - develops deeper roots, enabling it to reach deep into the soil for water.
  - shades the soil and reduces evaporation.
  - contains fewer weeds because it shades them out.

KEEP YOUR LAWN 3" OR HIGHER  
**NEVER** CUT OFF MORE THAN 1/3 OF THE BLADE EACH TIME YOU MOW!

#### **MULCH LEAVES AND GRASS CLIPPINGS INTO YOUR LAWN**

- Leaves and grass clippings are the best food for your lawn because they are a natural fertilizer rich in nutrients and organic matter.
- Grass clippings on the lawn return 60% of the nitrogen and 100% of the phosphorus to the soil.
- Mulching leaves and grass clippings may mean that you won't have to fertilize at all.
- Once mowed, sweep grass clippings back onto your lawn.

GRASS CLIPPINGS **CLOG** STORM DRAINS AND CAUSE WATER BACKUPS!

#### **SPREAD FERTILIZERS ON LIGHTLY AND USE CAUTION**

- Check product labels and follow directions carefully.
- Do not over-apply fertilizers, pesticides, herbicides or fungicides.
- Fertilizers can pollute your drinking water.
- If you fertilize right before it rains, the fertilizer won't have time to soak into the soil and will run directly into surface waters.

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NEVER FERTILIZE BEFORE IT RAINS!

## CHOOSE THE RIGHT SEED MIX AND NATIVE PLANTS FOR YOUR AREA

- The best seed mix for Michigan will contain Kentucky bluegrass, fescues and perennial rye-grass. Kentucky bluegrass needs sun.
- Native and drought-resistant plants and grasses will conserve water and require fewer pesticides and fertilizers.

FOR MORE INFORMATION, CONTACT THE LOCAL COUNTY CONSERVATION DISTRICT.

## BE SMART ABOUT WATERING

- If you have kept your lawn higher, you may not need to water it.
- In the hot, dry summer, grass grows slowly and the blades turn brown, but the plants don't die. If you can bear this stage, the grass will green after it rains.
- If you choose to water the grass, one inch of water per week is the rule.

LIGHT, FREQUENT WATERING APPLICATIONS ARE BEST.

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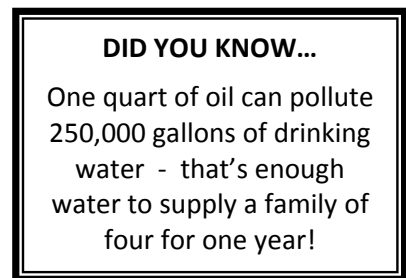
## PROTECT OUR WATERWAYS: KEEP ITEMS OUT OF STORM DRAINS

### WHAT IS THE PURPOSE AND IMPORTANCE OF A STORM DRAIN?

Storm drains are an important feature within our community because during heavy rainstorms the drains reduce flooding in streets and neighborhoods by transporting large volumes of water into rivers quickly. Filters are not installed in the drains because they would delay the passage of water. Therefore, whatever goes down storm drains will end up in our waterways (rivers, streams, lakes, creeks and oceans).

### TIPS TO PROTECT OUR STORM DRAINS

- ✓ Keep garbage out of storm drains. Put litter in trash cans and dispose of toxic substances properly.
- ✓ Use a broom, not a hose to clean spills.
- ✓ Grass clippings clog storm drains and cause water to backup onto the streets. Sweep clippings back onto your lawn.
- ✓ Never fertilize before it rains. When it rains, the fertilizer goes into storm drains and causes problems.
- ✓ Landscape to retain rain water:
  - Create small berms and depressions in your garden to hold rain water.
  - Border your lawn with deep-rooted flowers and shrubs that soak up water and reduce runoff.
- ✓ Landscape to prevent soil erosion.
- ✓ Pick up after your pet. Double bag the waste and put it in the trash (if your community allows) or flush it.



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## PROTECT YOUR DRINKING WATER: PLUG ABANDONED WELLS

### WHAT IS AN ABANDONED WELL?

A well which:

- has its use permanently discontinued.
- is in such disrepair that its continued use for obtaining groundwater is impractical.
- has been left uncompleted.
- is a threat to groundwater resources or may be a health or safety hazard.



### DANGERS OF UNPLUGGED ABANDONED WELLS

**Safety Hazard.** Each year the Michigan Department of Environmental Quality (MDEQ) receives reports of people, mostly children, falling into old wells. Injury or death may result.

**Health Hazard.** Abandoned wells act as conduits for contaminants to move from the surface into deeper aquifers. Drinking water contamination has been caused by abandoned wells.

**Environmental Hazard.** Deteriorated well casings or open, uncased boreholes allow movement of water between previously separated aquifers. This can degrade water quality. Abandoned wells have also been used for illegal dumping of waste.

### HOW TO LOCATE ABANDONED WELLS

- ✓ Search for water well drilling logs or old billing statements that show well depth and well location.
- ✓ Information can be found by contacting (a) the contractor who drilled or serviced the well, (b) the local health department, or (c) the MDEQ, Geological Survey Division in Lansing.
- ✓ If there are no records available for your well, look for the following:
  - Pipes sticking out of the ground.
  - Electrical switch boxes out in the yard.
  - Old crock, brick or stone structures.
  - Pipes sticking through walls or floors in the basement.
  - Cement pits in and under sheds.
  - Windmills or old hand pumps.
- ✓ Metal detectors may be used for locating buried wells:
  - First, locate where the old water line exited the home or building.
  - From this point, survey the ground with the metal detector moving away from the structure.
  - Use a marker to designate the location of any readings you get.
  - Well casings are typically 4 to 5 feet below grade and are located between 5 and 25 feet from your home.

Property owners are responsible for plugging abandoned wells on their property.

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## PROTECT YOUR WATER: CONSERVE

### WHY DO I NEED TO CONSERVE WATER?

Water conservation is the most cost effective and environmentally sound way to reduce our demand for water. Conserving water will allow us to extend our supply well into the future. Many states are already having water shortage issues. Since the 1970's, virtually all communities in the United States have grown significantly, but the amount of water produced is the same. Consequently, it is important that we learn to conserve so that future generations will have the same fresh water that we have been blessed with to enjoy!

Did you know...  
Producing 8 ounces of milk requires 48 million gallons of water!

Leak This Size (at 60 psi water pressure)		Water Loss in Gallons		Annual Loss in Dollars (at \$5.00 per 1,000 gallon rate)
		Per Day	Per Month	
1/32"	•	203	6,166	370
1/16"	•	811	24,666	1,480
1/8"	•	3,244	98,666	5,920
1/4"	•	12,948	393,833	23,630

Conserving water can also conserve money!!  
If you have a leak, see how much water you will pay for over time!

### TOP 10 THINGS THAT WILL SAVE WATER

- ✓ Water your lawn only when it needs it. Step on your grass. If it springs back when you lift your foot, it doesn't need to be watered.
- ✓ Do not run the hose while you are washing your car.
- ✓ Install water saving shower heads or flow restrictors.
- ✓ Avoid flushing the toilet unnecessarily. Dispose of tissue and other waste in the trashcan instead.
- ✓ Use a broom instead of a hose to clean the driveways and sidewalks.
- ✓ Capture tap water. While you are waiting for warm water, catch the water coming out and use it to water houseplants or your garden.
- ✓ Run only full loads in the washing machine and dishwasher.
- ✓ Shorten your showers.
- ✓ Fix leaky faucets and plumbing joints.
- ✓ Do not water the sidewalks, driveway or gutter.

Did you know...  
Producing a typical American Thanksgiving dinner for six people requires over 30,000 gallons of water!

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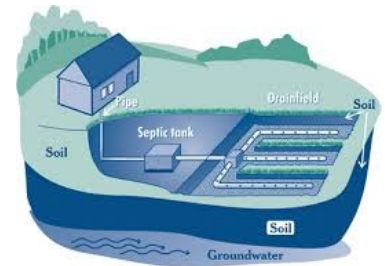
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1.7

## PROTECT YOUR DRINKING WATER: MAINTAIN YOUR SEPTIC SYSTEM

### WHAT IS A SEPTIC SYSTEM?

Water from your bathroom, kitchen and washing machine all go into a septic tank where solids settle out. The majority of the solids are digested by bacteria and the remaining fluid flows into a drainfield where it slowly filters through the soil. Organisms in the soil consume the remaining waste.



US Environmental Protection Agency

### ENSURE YOUR SEPTIC SYSTEM IS FUNCTIONING PROPERLY

- ✓ **Have your septic system inspected and pumped every 5 to 6 years.**
  - Hire a septic tank service contractor that is required to have a state permit to handle and dispose of sewage.
  - Businesses are listed in the telephone directory or call the local County Health Department.
- ✓ **Use less water.**
  - Don't let the water run while brushing your teeth, washing your hands and dishes, shaving, etc.
  - Spread your laundry washing out over the week to avoid putting a lot of water into the drainfield.
- ✓ **Avoid using chemicals and additives.**
  - Chemicals such as drain cleaners, toilet bowl cleaners and "miracle system cleaners" will kill the bacteria that break down sludge in your septic system.
  - Always check the product label to make sure it is safe to use in a septic system.
  - Alternative drain cleaner: ½ cup of baking soda, followed by ½ cup of vinegar, poured down the drain, let sit for a couple minutes and follow with boiling water.
- ✓ **Dispose only certain items in your septic system.**
  - Only dispose toilet wastes and water used for bathing, cooking, laundry and dishwashing into the septic system.
  - Cloggers: Diapers, cat litter, cigarette butts, coffee grounds, grease, feminine hygiene products, etc.
  - Killers: Household chemicals, gasoline, oil, pesticides, antifreeze, paint, etc.
- ✓ **Keep vehicles, livestock and buildings off your septic system.**
  - Keep vehicles away from the drainfield and septic tank and never build or pave over the drainfield.
  - Driving or building over the drainfield can impact the soil and break pipes. Soil compaction and paving prevents oxygen from getting into the soil. This oxygen is needed by bacteria to break down and treat sewage.
- ✓ **Plant only grass over and near your septic system.**
  - Roots from nearby trees and shrubs might clog and damage the system.
  - Do not apply fertilizers or manure over the drainfield.
- ✓ **LOCATE YOUR SEPTIC TANK AND DRAINFIELD, AND KEEP A RECORD OF INSPECTION AND PUMPAGE.**

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1.8

## PROTECT YOUR HEALTH AND ENVIRONMENT: KEEP YOUR HOME SAFE

### DID YOU KNOW...

...that items we use everyday could be hazardous? This is especially true if they are disposed of improperly. Dumping home toxics down drains, sinks and toilets, or putting them in the trash could hurt your health and the environment around you.

#### DISPOSAL INFORMATION

**LATEX PAINT.** Normal trash pickup (open the can and dry it out with cat litter. Keep it separated from your other trash.)

**AMMUNITION.** Check with your local County Sheriff's Department Property Room.

**SMOKE DETECTORS.** Return them to the manufacturer.

#### MAKE A DIFFERENCE BY...

- Minimize the frequency and application of home chemicals.
- Use a broom, not a hose to clean spills.
- Maintain your cars by repairing leaks immediately and disposing fluids properly.
- Store home toxics properly by keeping in cool, dry areas and protect products from freezing.
- Dispose of home toxics properly. Contact the local health department for appropriate disposal information.

#### CALL YOUR COUNTY FOR INFORMATION ON DISPOSAL OF THE FOLLOWING ITEMS

- ✓ AEROSOLS (Full or Partially Full)
- ✓ ANTIFREEZE \*
- ✓ ASPHALT AND ROOFING TAR
- ✓ CAR BATTERIES \*
- ✓ CLEANERS AND POLISHES
- ✓ FLAMMABLES (Gasoline, Starting Fluids)
- ✓ HOME REPAIR PRODUCTS (Glues, Caulking)
- ✓ HOUSEHOLD BATTERIES
- ✓ MERCURY (Thermometers, Home Thermostats)
- ✓ NICKEL CADMIUM RECHARGABLE BATTERIES (used in cordless phones, camcorders, cordless tools, etc.)
- ✓ OIL BASED PAINT
- ✓ PAINT THINNERS, SOLVENTS, VARNISHES
- ✓ PESTICIDES
- ✓ PHOTOGRAPHIC CHEMICALS
- ✓ TRANSMISSION OR BRAKE FLUID \*
- ✓ USED MOTOR OIL \*
- ✓ WEED KILLERS



\* Your local auto service station may accept these items.

### DON'T DUMP IT IF YOU WOULDN'T DRINK IT!

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1.9

## PROTECT THE ENVIRONMENT: PROPERLY DISPOSE OF PHARMACEUTICAL DRUGS

### WHAT IS A PHARMACEUTICAL?

A pharmaceutical drug, also called medicine, is any substance intended for use in the diagnosis, cure, mitigation, treatment or prevention of disease.



Did you know that...

If you flush prescriptions down the toilet, they will likely end up in the groundwater or surface water.

For further information, please visit:  
[www.epa.gov/ppcp](http://www.epa.gov/ppcp)

- ✓ Protect the groundwater and surface water bodies.
- ✓ Protect your family and our community.
- ✓ Prevent the illegal diversion of unused medications.
- ✓ Prevent accidental drug interactions.
- ✓ Keep prescription drugs out of the reach of children.

### FEDERAL GUIDELINES FOR THE PROPER DISPOSAL OF DRUGS

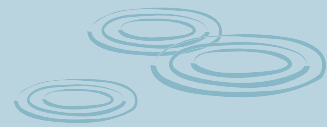
- 1st.** Remove unused, unneeded or expired prescription drugs from the original containers; crush solid medications or dissolve them in water.
- 2nd.** Mix the prescription drugs with undesirable substances such as coffee grounds or cat litter (less appealing to pets and children).
- 3rd.** Place them in a container (i.e. empty can, sealed bag) and put them in the trash.
- 4th.** Remove and destroy all identifying personal information (prescription label) from the medication container.

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# Stormwater and the Construction Industry



## Protect Natural Features



**Bad**



**Good**

- Minimize clearing.
- Minimize the amount of exposed soil.
- Identify and protect areas where existing vegetation, such as trees, will not be disturbed by construction activity.
- Protect streams, stream buffers, wild woodlands, wetlands, or other sensitive areas from any disturbance or construction activity by fencing or otherwise clearly marking these areas.

## Construction Phasing



**Bad**



**Good**

- Sequence construction activities so that the soil is not exposed for long periods of time.
- Schedule or limit grading to small areas.
- Install key sediment control practices before site grading begins.
- Schedule site stabilization activities, such as landscaping, to be completed immediately after the land has been graded to its final contour.

## Vegetative Buffers

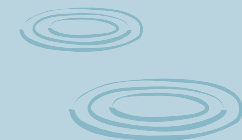


**Bad**



**Good**

- Protect and install vegetative buffers along waterbodies to slow and filter stormwater runoff.
- Maintain buffers by mowing or replanting periodically to ensure their effectiveness.



## Silt Fencing



**Bad**



**Good**

- Inspect and maintain silt fences after each rainstorm.
- Make sure the bottom of the silt fence is buried in the ground.
- Securely attach the material to the stakes.
- Don't place silt fences in the middle of a waterway or use them as a check dam.
- Make sure stormwater is not flowing around the silt fence.

# Maintain your BMPs!

[www.epa.gov/npdes/menuofbmps](http://www.epa.gov/npdes/menuofbmps)

## Site Stabilization



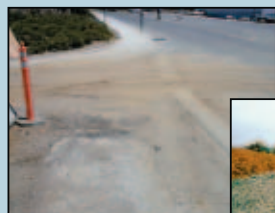
**Bad**



**Good**

- Vegetate, mulch, or otherwise stabilize all exposed areas as soon as land alterations have been completed.

## Construction Entrances



**Bad**



**Good**

- Remove mud and dirt from the tires of construction vehicles before they enter a paved roadway.
- Properly size entrance BMPs for all anticipated vehicles.
- Make sure that the construction entrance does not become buried in soil.

## Slopes



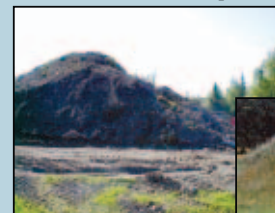
**Bad**



**Good**

- Rough grade or terrace slopes.
- Break up long slopes with sediment barriers, or under drain, or divert stormwater away from slopes.

## Dirt Stockpiles



**Bad**



**Good**

- Cover or seed all dirt stockpiles.

## Storm Drain Inlet Protection



**Bad**



**Good**

- Use rock or other appropriate material to cover the storm drain inlet to filter out trash and debris.
- Make sure the rock size is appropriate (usually 1 to 2 inches in diameter).
- If you use inlet filters, maintain them regularly.



# Preventing Groundwater Contamination



## Fact Sheet

### WHY BE CONCERNED?

Good quality groundwater is one of Michigan's great natural resources. Groundwater provides drinking water for about 44 percent of the state's population. Unfortunately it might become contaminated when even seemingly harmless materials and wastes are improperly handled. Contamination may involve different chemicals, excess amounts of nitrogen and phosphorus, and pathogens like bacteria and viruses. Once groundwater is contaminated, it may be difficult and expensive to clean up. Sometimes it is impossible to clean it up to drinking water standards. This contamination not only threatens public health and the environment, it can also cost businesses and the public large amounts of money in fines, lawsuits, and cleanup costs. Due to the high costs of contamination, banks and lending institutions often require environmental audits of properties before making loans to businesses.

Future groundwater contamination can be avoided. The following will help you identify types of materials that you might have and how these materials might get into the groundwater. In addition, it presents several waste reduction tips which are designed to help small businesses.

### MATERIALS OF SPECIAL CONCERN

Materials that contaminate groundwater are usually liquids or water soluble solids. Contamination caused by gases is possible, but rare.



Of particular concern for groundwater protection are materials such as:

- *Acids*
- *Antifreeze*
- *Bases (caustics)*
- *Cleaning fluids & detergents*
- *Cooling water*
- *Degreasers*
- *Dust or emission collector water*
- *Fertilizers*
- *Fuels*
- *Fungicides*
- *Herbicides*
- *Inks*
- *Liquids containing heavy metals*
- *Medicines*
- *Oils and greases*
- *Paints*
- *Pesticides*
- *Rinse water*
- *Salts*
- *Sanitary sewage*
- *Sewage sludge*
- *Solvents*
- *Wash water*
- *Waste process sludges*
- *Waste process solutions*

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY  
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Environmental Assistance Center  
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MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY



Of course, there are any number of materials that can contaminate groundwater. The above substances are spotlighted because they are commonly used or produced by businesses. Table 1 shows examples of wastes commonly generated by specific businesses that may contaminate groundwater.

**Table 1**

<b>WASTES GENERATED BY SMALL BUSINESSES THAT MAY CONTAMINATE GROUNDWATER</b>	
<b>BUSINESS</b>	<b>PROBLEM WASTE GENERATED</b>
All Businesses	Sanitary sewage
Vehicle Service and Body Repair	Oil, antifreeze, solvents, fuels, paints, metal residues
Car/Truck Wash	Road salt, gasoline, antifreeze, oil-laden wash and rinse waters, cleaners
Metal Parts Cleaning	Alkaline solutions, solvents, phosphate solutions, metal residues, rinse waters, oil and greases
Laundromat	Dirty washwater, detergents, laundry pre-wash solvents
Dry Cleaning	Solvents, filters
Furniture Repair and Refinishing	Solvents, paints, varnishes, shellac
Photo Finishing/Silk Screening/Printing	Process chemicals, inks
Paint Mixing	Paints, solvents, pigments
Food Processors	Food scraps and juices, washwater, cooling water, salt

### **GROUNDWATER CONTAMINATION ROUTES**

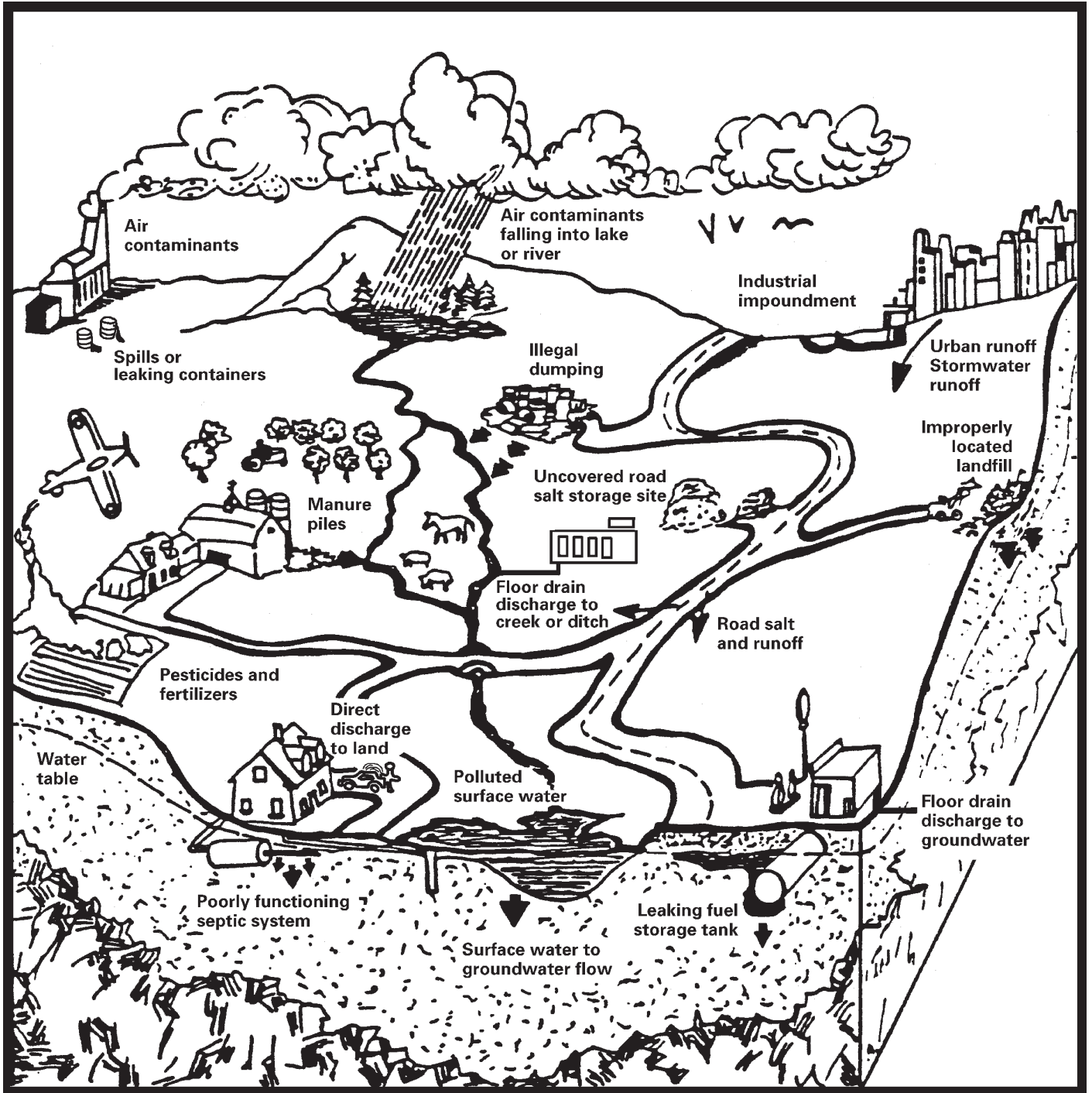
Business owners, municipalities, and the public should understand that contamination can enter the groundwater by many routes. Figure 1 shows common ways that might lead to groundwater contamination.

Anyone improperly using any of the following waste disposal options may be contributing to groundwater contamination.



Figure 1

**GROUNDWATER CONTAMINATION ROUTES**



## Floor Drains

Businesses may use floor drains to dispose of liquid wastes only if the drains:

- (1) discharge to a municipal sewer system and the discharge has been approved by the local sewer authorities;
- (2) discharge to a holding tank from which the waste is subsequently pumped and hauled by a licensed hauler for appropriate disposal at an approved facility; or
- (3) discharge to ground or surface waters if the business has a permit or an exemption to discharge that waste from the Michigan Department of Environmental Quality under Part 31 of 1994 P.A. 451, as amended.

Businesses and municipalities with floor drains in their facilities that do not comply with one of the three permissible options are urged to fill and cap them with concrete. This will prevent accidental discharges, particularly by employees that may not follow established procedures. It may be necessary to install secondary containment to capture liquids that formerly went down the drain.

Similarly, any unused pipe or conduit that exits from a business facility should be permanently blocked or removed to prevent improper discharges.

## Septic Systems

Industrial chemicals and wastewater should not be discharged to septic systems that are designed for sanitary wastes. Not only is this practice a regulatory violation, but it will usually destroy the bacteria that are needed for the system to function properly.

### Chemicals and Wastes Contaminate the Groundwater Through These Common Systems

- Floor drains connected to a storm sewer, ditch, or stream;
- Floor drains connected to tile fields or dry wells;
- Septic tanks and dry wells;
- Septic tanks and tile fields;
- Unlined ponds or lagoons;
- Pouring or spraying directly onto the ground.

## Storage Tanks

There are different federal and state regulatory requirements for above ground and underground storage tanks and for tanks holding hazardous and petroleum products and hazardous waste. Businesses must have measures to protect the tanks from corrosion and insure that no leaks, spills, or overfilling take place. Annual tank registration is required for some tanks holding products.

A current trend in industrial design is to use above ground tanks and piping rather than underground tanks and piping systems. This provides easier monitoring and maintenance and quicker detection of leaks.

### REGULATORY HELP

Table 2 on page 4 lists state and local agencies that have groundwater protection regulations and may provide guidance to your business on storage and disposal of products and wastes. These agencies can provide explanations of federal and state laws and offer technical advice on how to prevent contamination.

### PREVENTION OF GROUNDWATER CONTAMINATION

Businesses are wise to design their facility, production processes, and operating procedures with prevention of discharges to the environment in mind. Often, advanced planning will avoid the need to obtain



**Table 2**  
**STATE AND LOCAL REGULATORY AGENCIES**

<b>GROUNDWATER DISCHARGE</b>	Water Division Michigan Department of Environmental Quality 517/373-8148 or District Office
<b>SURFACE WATER DISCHARGE &amp; STORMWATER RUNOFF</b>	Water Division Michigan Department of Environmental Quality 517/241-1346 or District Office
<b>WASTE DISPOSAL</b>	Waste and Hazardous Materials Division Michigan Department of Environmental Quality 517/373-2690 or District Office
<b>ABOVEGROUND STORAGE TANKS</b> —with contents having a flashpoint below 200°F <b>UNDERGROUND STORAGE TANKS</b>	Waste and Hazardous Materials Division Michigan Department of Environmental Quality 517/335-7211 Local Fire Marshal
<b>GROUNDWATER TESTING</b>	County Health Department
<b>SEPTIC SYSTEM INSTALLATION</b>	County Health Department or Water Division Michigan Department of Environmental Quality 517/373-8148
<b>BUILDING AND OUTDOOR PRODUCT STORAGE (SECONDARY CONTAINMENT)</b>	Water Division - District Office Environmental Science and Services Division Michigan Department of Environmental Quality (for secondary containment and pollution incident prevention plan publications) 800/662-9278 Consultation, Education & Training Division Michigan Department of Labor and Economic Growth (for flammable & combustible liquids storage) 517/322-1809 Local Government Building, Zoning Office, or Fire Marshal
<b>AGRICULTURAL GROUNDWATER ISSUES</b>	Environmental Stewardship Division Michigan Department of Agriculture 517/241-0236
<b>PUBLIC DRINKING WATER</b>	Water Division Michigan Department of Environmental Quality 517/241-1355 U.S. Environmental Protection Agency Drinking Water Hotline 800/426-4791
<b>REPORTING SPILLS</b>	Reporting requirements depend on which regulations a facility is subject to. Go to <a href="http://www.michigan.gov/deq">www.michigan.gov/deq</a> and search on "Spill /Release Reporting"

If you are unsure who to contact, call the Environmental Assistance Center at 800/662-9278 or search these Internet sites for more information:

[www.michigan.gov/deq](http://www.michigan.gov/deq)  
[www.michigan.gov/mda](http://www.michigan.gov/mda)  
[www.michigan.gov/cis](http://www.michigan.gov/cis)  
[www.epa.gov/region5](http://www.epa.gov/region5)

groundwater discharge permits; help assure compliance with local, state, and federal regulations; reduce the possibility of potential liability and clean-up costs; and may result in lower operating costs.

Here are some ways businesses can prevent groundwater contamination:

- Practice **waste reduction**. Make a list of current waste generated and ask, for each item, "Is there a way I can avoid producing this waste?" Try to reduce the toxicity and amount of waste generated. Remember that unused raw materials, inefficient production processes, and poor maintenance practices cost extra money as well as increase the amount of waste requiring disposing. In addition to considering the following suggestions, Michigan's small businesses may want to request a nonregulatory pollution prevention assessment through the Retired Engineer Technical Assistance Program (RETAP). Call 800/662-9278 for more information.

*-Replace toxic raw materials with non-toxic or less toxic raw materials wherever possible.*

*-Replace toxic operational supplies, such as cleaners and solvents, with non-toxic or less toxic materials wherever possible.*

*-Improve production process efficiency so that less raw material ends up as waste that must be disposed. Reuse samples in production.*

*-Encourage employees to think "waste reduction." Better yet, include them in the planning process – they have good ideas. Give them an economic incentive to reduce waste.*

*-Reuse and recycle process by-products as raw materials, either on-site or in another company's process. Examples include process and cleaning solutions, wash water, rinse water, and cooling water.*

*-Implement a computerized inventory control system that will ensure that chemicals are purchased only in required amounts and provides an alert to possible spoilage or obsolescence.*

*Also, make sure that raw material containers are fully emptied or, if partially filled, properly labeled and re-entered in the inventory.*

*-Implement a computerized waste control system. Make sure that wastes are properly labeled so there is no need for future testing and analysis. Also, make sure that wastes are mixed only when there is no potential for reuse or recycling and when mixing is not prohibited by regulations.*

*-Design process equipment to minimize waste. Use a centrifuge rather than a filter, for example, to avoid filter cartridge disposal.*

*-Implement an aggressive equipment maintenance program to prevent leaks. Periodically check tanks, seals, pipe joints and other equipment for needed repairs.*

- Contain and immediately clean up any spills, leaks, and drips that do occur. Build or purchase secondary containment structures. Use drip pans under spigots or other areas where there is likely to be seepage. Review the DEQ publication, "Guide to Understanding Secondary Containment Requirements in Michigan," for more information.
- Use absorbents for spills when necessary, but do not rely upon them as the first line of defense. Used absorbents must be disposed with the same degree of care as the materials that are being absorbed. It is more desirable to recapture the material in a form that allows reuse or recycling.

- Install a catch basin in loading and unloading areas. Nearly one-third of all accidental spills occur at loading docks. Keep rainwater and dirt out of the catch basin.
- Hook up to a municipal sewer system if possible. Pretreat process wastes to comply with local ordinances or applicable federal categorical pretreatment standards.
- If hook up to a municipal sewer system is not possible, route wastewaters (such as contaminated washwater) to holding tanks, which can be periodically pumped out. Hire a licensed liquid industrial waste hauler to pick up the wastewater for proper disposal.
- If you are hooked up to your own treatment and disposal system, make sure it is permitted by either the local health department or the Michigan Department of Environmental Quality, it is upgraded to the current treatment standards, and it is operated and maintained by properly trained employees.
- Perform all outside work on a sealed concrete or asphalt paved surface surrounded by a berm or dike.
- Store raw materials and wastes under a roof or other protective cover and on a sealed concrete or asphalt paved surface. Provide additional secondary containment when necessary.
- Make sure the manufacturer's directions are being followed when mixing materials to avoid using more than needed and making materials more hazardous than necessary. For large volumes and routine mixing, it is better to install an automated mixing system.
- Do not dispose of items that contain hazardous materials, such as PCB, mercury and lead, in trash that will be buried in a sanitary landfill or that will be incinerated. Recycle used fluorescent and high intensity lamps, small batteries, capacitors containing PCB, mercury thermometers, and other lab instruments or handle them as hazardous waste.
- Develop emergency response plans that identify potential problem areas and address what actions are needed to reduce environmental and health risk. Under some circumstances, you may be legally required to have these plans.
- Learn more about groundwater and the impact you have on it. Numerous resources are available through your library, by contacting the environmental agencies, or searching the Internet. For example, go to [www.deq.state.mi.us](http://www.deq.state.mi.us) or [www.epa.gov/seahome/gwprimer.html](http://www.epa.gov/seahome/gwprimer.html).

Experience has proven that waste reduction and conscientious material management usually pay for themselves within a short time. Proper material management may prevent future liability concerns. It pays to handle material wisely – both short term *and* long term.

## BUSINESS-SPECIFIC WASTE REDUCTION TIPS

### AGRICULTURE/LAWN CARE/ GROUNDSKEEPING

- Follow the manufacturer's directions exactly to mix and apply insecticides, fungicides, rodenticides, fertilizers, and other agricultural and floral products.
- Measure materials when mixing so that only the amount needed is mixed and the concentrations of the active ingredients are within recommended limits.
- Apply materials only as directed; do not spray on windy or rainy days, except when wet application is instructed.
- Do not spray materials near open water. Many agricultural products are toxic to aquatic life.
- Rinse containers prior to disposal. Use the rinse water in mixing new chemical batches.
- Ask the retailer of the product to take rinsed plastic containers back and return them to the manufacturer for recycling. Plastic insecticide and other containers are being recycled in many areas.

### BLENDING/MIXING PAINTS & CHEMICALS

- Mix similar batches in succession to avoid stringent cleaning of mixing equipment between batches.
- When volume requirements permit, dedicate mixing equipment to specific substances or colors.
- Use water-based paints and cleaners in preference to solvent-based materials.
- Collect and reuse spent cleaning solvents as thinners for new batches of the same composition. For example, spent cleaning solvents can be used in paints.
- Reclaim used cleaning solvents that cannot be used in new product through on-site distillation or off-site solvent reclamation.



### AUTO BODY SHOPS

- Use water-based paints and cleaners whenever possible.
- Use high-solids, solvent-based paints with low volatile organic compounds (VOC) when suitable water-based paints are not available.
- Use low-pressure, high-volume paint applicators to minimize paint overspray.
- Paint in batches of similar colors.
- Use paint gun washers to clean spray guns; this equipment is much more efficient and uses less solvent than manual gun cleaning.
- Collect waste paints, oils, and chlorinated solvents separately for recycling.
- Fully discharge all pressurized spray paint cans and recycle the empty containers as scrap metal.

### CAR/TRUCK WASHES

- Place washing pads on a slope so wash waters can easily be collected.
- Recycle and reuse all runoff from washing pads. For large operations, the use of reverse osmosis or ultrafiltration systems may be justified to remove contaminants and provide "clean" washing fluid.
- Replace cleaning products containing highly toxic or harsh materials with safer, biodegradable products.
- Use high pressure, low-flow washing nozzles and regulate water flow to reduce runoff volume.
- Use hot water since it is a "better solvent" than cold water.



## BUSINESS-SPECIFIC WASTE REDUCTION TIPS

### METAL PARTS AND EQUIPMENT CLEANING

- Switch from petroleum or chlorinated solvent-based cleaners to water-based cleaners. Strive to eliminate all usage of chlorinated solvents.
- Perform all cleaning at cleaning stations that are designed to capture and reuse the cleaning fluid. Keep covers on the cleaning stations closed, except while the station is being used.
- Use immersion cleaning for easily removed contaminants.
- Use high-pressure, low-volume spray nozzles to remove difficult contaminants. Use ultrasound devices in the cleaning tank to improve cleaning efficiency.
- Maintain cleaning baths at the manufacturer's recommended concentration and temperature.
- Allow cleaned parts and assemblies to drain or dry over the cleaning station long enough so that there is no dripping onto the floor.
- Reclaim dirty water-based cleaners through ultrafiltration and dirty solvents through distillation. Reclamation of water-based cleaning solutions is usually done on-site. However, businesses may reclaim solvents on-site with in-house stills or rely on off-site distillation services.
- Use less solvent by using a spray bottle to moisten the rags instead of soaking the rags in solvent or by spraying the solvent directly on the part and then wiping it off.

### FURNITURE REPAIR AND REFINISHING

- Use water-based paints and cleaners in preference to solvent-based materials.
- Reuse solvents used to rinse paint guns and piping for thinning paints of the same color.
- Reclaim dirty water-based cleaners through ultrafiltration, and dirty solvents through distillation. Reclamation of water-based cleaning solutions is usually done on-site. However, businesses may reclaim solvents on-site with in-house stills or rely on off-site distillation services.
- Stain or paint parts with the same color at the same time, and schedule batch painting of lighter shades of paint prior to darker shades so it is not necessary to clean the equipment between jobs.
- Flush equipment first with dirty solvent before final cleaning with virgin solvent.
- Train spray gun operators in proper spray techniques to minimize coating waste generation.
- Replace water-based paint booth filters with dry filters.

### LAUNDROMATS/DRY CLEANERS

- Where possible, place washing machines on a slightly slanted floor so that accidental leaks will run to a collection area where workers can easily gather the waste materials for reclamation or proper disposal.
- Install and use a recirculating or closed loop system to collect and reclaim laundry wastewaters and dry cleaning solvents. Use ultrafiltration or reverse osmosis to reclaim laundry wastewaters. Use distillation units to reclaim dry cleaning solvents.
- Use condensate water containing perc as part of the prespotting solution.
- Put up signs in laundromats asking customers to limit the use of bleaches, home degreasers, and other harsh chemicals. Explain that the reason for the request is to protect our groundwater from contamination.
- Clean filters, lint screens, drying sensors, and cooling condenser coils regularly.
- Replace seals and gaskets on doors and button traps as needed.
- Replace transfer machines with dry-to-dry machines.

### PHOTOFINISHING



- Use counter-current rinsing in photo developing to minimize the disposal of contaminated water.
- Use squeegees to remove excess liquid during the development of photographic film to minimize carry-over of chemicals from one bath to the next.
- Monitor and maintain the concentrations of bleach fixer to prolong the life of the fluid.
- Use floating lids on bleach and other fixer solutions to minimize oxidation and extend fluid life.
- Keep unused solutions in closed containers to prevent oxidation. Add glass marbles to the containers as fluids are used, to minimize the amount of air in the closed containers.
- Use ion exchange to regenerate color developer.
- Collect spent photographic fixer solutions (as well as photographic paper and film) for silver recovery. The silver recovery may be done in-house or by a silver reclaimer.
- Recycle cartridges, cassettes, and photographic paper spools.

## BUSINESS-SPECIFIC WASTE REDUCTION TIPS

### PRINTING/SILK SCREENING

- Use non-toxic inks, free of heavy metal pigments.
- Use water-based inks, ultraviolet inks or electron beam drying (EB) inks in preference to solvent-based inks.
- Batch similar printing orders (i. e., same ink) to minimize cleanup between ink changes.
- Fill ink fountains only for a run or shift. Return unused, non-emulsified ink to a closed storage container. Install automatic ink levelers to keep ink fountains at their optimal levels for good print quality.
- Clean ink fountains only when changing color or to prevent drying out. Use a non-drying spray aerosol to prevent ink dry-out when possible.
- When possible, dedicate presses to a specific ink type and color.
- Mix ink cleaning solutions and ink residues with new ink to the maximum extent possible. Generally, these materials can be used in black inks.
- Collect and reclaim spent cleaning solvents that cannot be reused in new ink.
- Use on-site distillation or an off-site solvent reclaimer. Spent solvents must be handled as hazardous waste.
- Collect used cleaning rags and absorbent pads and have them cleaned by a commercial laundry service.

### VEHICLE MAINTENANCE AND REPAIR SHOPS



- Collect used motor oil, transmission fluid, brake fluid, grease, and oil filters for recycling.
- Used oil filters should be turned upside down so that as much oil as possible is drained into the waste oil container. The waste lubricants and drained filters should be marketed to a used oil recycler.
- Collect used antifreeze. Most service stations will want to market the material to an antifreeze recycler. However, large fleet maintenance operations may wish to consider installing a distillation unit for in-house recycling of the material. A relatively low-cost unit will quickly pay for itself in reduced disposal costs, plus the value of the reclaimed antifreeze.
- Collect waste gasoline and diesel fuel. Do not use for cleaning. Instead, market to a licensed fuel reclaimer.
- Use water-based cleaners in preference to chlorinated or petroleum solvents to the extent possible.
- Strive to eliminate use of solvent-based cleaners.
- Require maintenance personnel to wash parts at cleaning stations that are designed to capture and reuse the cleaning material. This is especially important when petroleum solvents or chlorinated solvents are used. Keep covers closed on the cleaning stations when not in use.
- Collect dirty petroleum solvents and chlorinated solvents for recycling.
- Reuse automotive parts when possible or recycle as scrap metal.
- Prevent leaks and spills as much as possible by using drip pans under vehicles. Use absorbent pads and pigs, rather than granular absorbents, to soak up oily spills. The cloth-covered materials can be reused after squeezing and/or laundering.
- Have a commercial service launder wiping rags rather than discarding them with the general trash.
- Send batteries to a reclamation facility or back to the distributor.
- Have scrap tires picked up by a registered hauler and taken for recycling.
- Buy motor oil in bulk to reduce packaging waste.
- Use less solvent by using a spray bottle to moisten the rags instead of soaking the rags in solvent or by spraying the solvent directly on the part and then wiping it off.

***By following these suggestions, businesses and municipalities in Michigan can save money and help protect groundwater quality. Liability is also reduced when materials are properly managed. Preventing hazardous materials from entering the groundwater benefits everyone.***

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