# APPENDIX G

## Best Management Practices for Single Family Residences

# 1 INTRODUCTION

The actions we take each day, in and around our homes, may have a profound effect on our drinking water quality. Small amounts of pollution from many different sources can significantly affect our groundwater resource. Yard maintenance, waste storage, car washing and maintenance, and improper septic system use and maintenance are some of the activities that can adversely impact water quality. The best management practices (BMPs) discussed in this section are practical ways to keep our drinking water from becoming polluted in the first place. It is recommended that all residences within the Aquifer Protection Area use these BMPs.

# 2 SEPTIC SYSTEMS

The U.S. Environmental Protection Agency estimates that 30 percent of U.S. households use septic tanks or other on-site wastewater treatment methods (EPA, 1999). Conventional septic systems are designed to operate indefinitely if properly maintained. However, if a septic system is not well maintained, its functional life may be 20 years or less. Maintaining your system is a good investment compared to the expense and inconvenience of replacing a failed system. Conducting regular inspections and maintenance for 20 years will typically cost one-fifth to one-tenth as much as removing and replacing the system at the end of the 20-year period. (EPA, 1999). Symptoms of a failing septic system include strong odors, ponding of improperly treated wastewater, and backup of wastewater into the home. Less obvious is the measurable decline in water quality that occurs when a system is not operating properly. By conducting regular inspections and maintenance, you may avoid the greater expense and property disruption of replacing a failed system.

## 2.1 BEST MANAGEMENT PRACTICES

Have your system inspected once every two years and pumped at least every three years, or more frequently if the inspection indicates that pumping is necessary.

- Avoid placing solvents, poisons, and other household chemicals into the septic system or household drains. These substances may kill the beneficial bacteria within the tank and drain field; they may also contaminate drinking water.
- Dispose of garbage in the trashcan rather than using an in-sink "garbage disposal."
- Avoid organic solvents marketed as septic system cleaners or substitutes for sludge pumping (e.g. Krane Products: Septic Helper or Septic 2000). Some communities have ordinances forbidding the use of these substances, because the chemicals can migrate to the groundwater causing aquifer contamination.

- Avoid putting solids or greasy material down drains or toilets: paper towels, cigarettes, cat litter, feminine hygiene products, and residual cooking fat should be placed in the garbage.
- Install low volume plumbing fixtures to prevent overloading the system.
- If you are not a full-time resident, consider installing a composting toilet in lieu of a traditional septic system. Septic drain fields used seasonally often develop incomplete biological mats, which lowers system performance.

# 3 AUTOMOBILE WASHING

Most residents wash their cars in the driveway or on the street. Wash waters typically flow to a storm drain or ditch, which discharges storm water directly to the nearest drainage, stream, or lake.

## 3.1 BEST MANAGEMENT PRACTICES

- Wash your car directly over your lawn or make sure the wash water drains to a vegetated area. This allows the water and soap to soak into the ground instead of running off into a local water body.
- Ideally, no soaps or detergents should be used, but if you do use one, select one without phosphates.
- Commercial products are available that allow you to clean a vehicle without water. They were developed for areas where water is scarce, so a water saving benefit is realized as well as reduced pollution.
- Use a nozzle on your hose to save water.
- Do not wash your car if rain is expected.
- **Consider not washing your car at home. Take it to a commercial car wash that has a recycle system and discharges wastewater to the sanitary sewer for treatment.**

# 4 AUTOMOBILE MAINTENANCE

Some of us are "weekend mechanics". We enjoy the cost savings of changing our own oil and antifreeze, and generally making our car perform its best. There are many potentials for storm water pollution associated with these activities, however, the following BMPs will help you minimize pollution while servicing your car.

## 4.1 BEST MANAGEMENT PRACTICES

- Recycle all oils, antifreeze, solvents and batteries. Motor Oil / Gear Oil is not accepted at the Landfill. Motor Oil/Gear Oil may be taken to the City Streets Shop or to many of the automotive parts retailers in town.

- After you change oil in your vehicle, pour the liquid into a clean, unbreakable container with a good sealable cap, such as a one-gallon plastic jug. Do not mix the used oil with water or other products. Used antifreeze should be drained into a sturdy container. Contact Laramie Landfill/Recycling Center (307-721-5279) for further instructions and disposal times.

- The best way to dispose of used automotive batteries is to return your old battery to the company from whom you are purchasing a new one. Automotive batteries are also accepted at the Laramie landfill. Alkaline batteries may be placed in your normal trash. Nickel cadmium (NiCad) or lithium rechargeable batteries should be recycled at the Laramie Landfill/Recycling Center.

- Solvents such as paint thinner can be reused by allowing the solids to settle to the bottom of the container, then pouring off the clear liquid into a well-labeled container for reuse later. The solids can then be dried and thrown away.

- The City of Laramie accepts Household Hazardous Waste at the landfill by appointment only. They require 24 hours' notice when making an appointment so they can have staff available. They are open Monday - Friday between 9:00 am - 12:00 pm and 1 pm - 4 pm. In addition, there are local businesses that may pay you for some of your "waste products."

- Never dump new or used automotive fluids or solvents on the ground, in a storm drain or street gutter, or in a water body. Eventually, they will make their way to the Laramie River.

- Frying and cooking oil is not accepted at the Landfill. Green barrels for cooking oils are located behind the Moose Lodge at 409 S. 3rd Street.

- Do not mix wastes. The chlorinated solvents in some carburetor cleaners can contaminate a huge tank of used oil, rendering it unsuitable for recycling. Always keep your wastes in separate containers that are properly labeled and store them out of the weather.

- Use care in draining and collecting antifreeze to prevent accidental spills. Spilled antifreeze can be deadly to cats and dogs that ingest it.

- Perform your service activities on concrete or asphalt or over a plastic tarp to make spill cleanup easier. Keep a bag of kitty litter on hand to absorb spills. Sprinkle a good layer

on the spill, let it absorb for a little while and then sweep it up. Place the contaminated litter in a plastic bag, tie it up, and dispose of it in your regular garbage. Take care not to leave kitty litter out in the rain; it will form a sticky goo that is hard to clean up.

- If you are doing bodywork outside, be sure to use a tarp to catch material resulting from grinding, sanding and painting. Dispose of this waste by double bagging in plastic and placing in your garbage.

# 5 STORAGE OF SOLID WASTES AND FOOD WASTES

Improper storage of food and solid waste at residences can lead not only to water pollution problems, but problems with neighborhood pets and vermin as well. Following the BMPs listed below can help keep your property a clean and healthy place to live.

## 5.1 BEST MANAGEMENT PRACTICES

- All waste containers kept outside should have lids.
- Leaking waste containers should be replaced.
- Store waste containers under cover if possible, or on grassy areas.
- Inspect the storage area regularly to pick up loose scraps of material and dispose of them properly.
- Recycle as much as you can.
- Purchase products that have the least amount of packaging materials.
- Compost biodegradable materials such as grass clippings and vegetable scraps instead of throwing them away. Your flowerbeds will love the finished compost, and we won't fill up our landfills so quickly. See the section on composting for BMPs relating to that activity.

# 6 COMPOSTING

Composting is a positive activity as long as some commonsense rules outlined below are followed. If you choose to compost, the following BMPs should be utilized.

## 6.1 BEST MANAGEMENT PRACTICES

- Compost piles must be located on an unpaved area where runoff can soak into the ground or be filtered by grass and other vegetation.

- Compost piles should be located in an area of your yard not prone to water ponding during storms, and should be kept well away from water bodies and drainage paths.
- Avoid putting hazardous or non-decomposable waste in the pile.
- Build covered bins of wood, chicken wire or fencing material to contain compost so it can't be washed away. Albany County Cooperative Extension Office at 721-2571 to get free composter designs and materials lists.
- A fun alternative to traditional composting is worm composting. You can let worms do all the work for you by keeping a small vermiculture box just outside your kitchen. For more information on getting started with worms, contact the Albany County Cooperative Extension Office at 721-2571 or visit the Albany County Public Library.

# 7 YARD MAINTENANCE AND GARDENING

This section deals with yard maintenance activities. Over watering, over fertilizing, improper herbicide application and improper disposal of trimmings and clippings can all contribute to serious water pollution problems. Following the BMPs listed below will help alleviate pollutant runoff.

## 7.1 BEST MANAGEMENT PRACTICES

- Follow the manufacturer's directions exactly for mixing and applying herbicides, fungicides and insecticides, and use them sparingly. Never apply when it is windy or when rain is expected. Never apply over water, within 100 feet of a wellhead, or adjacent to streams or other water bodies. Triple-rinse empty containers, using the rinsate for mixing your next batch of spray, and then double-bag and dispose of the empty container in your regular garbage.
- Never dispose of grass clippings or other vegetation in or near storm drains, natural drainages, streams, or lakes.
- Follow manufacturer's directions when applying fertilizers. More is not better, either for your lawn or for local water bodies. Never apply fertilizers over water or adjacent to ditches, streams or other water bodies. Remember that organic fertilizers have a slow release of nitrogen, and less potential to pollute than synthetic fertilizers. • Save water and prevent pollution problems by watering your lawn sensibly. Lawns and gardens typically need the equivalent of 1" of rainfall per week. You can check on how you're doing by putting a wide mouth jar out where you're sprinkling and measure the water with a small plastic ruler. Over watering to the point of runoff can carry polluting nutrients to the nearest water body.

- Consider planting a vegetated buffer zone adjacent to any water bodies on your property. Call the Laramie Rivers Conservation District at 307-721-0072 for advice and assistance in developing a planting plan.
- Make sure all fertilizers and pesticides are stored in a covered location. Rain can wash the labels off of bottles and convert 50 pounds of fertilizer into either a solid lump or a river of nutrients.
- Compost all yard clippings, or use them as mulch to save water and keep down weeds in your garden. See the Composting section for more information.
- Practice organic gardening and virtually eliminate the need to use pesticides and fertilizers. Contact Albany County Cooperative Extension at 721-2571 for information and classes on water-friendly gardening.
- Pull weeds instead of spraying and get some healthy exercise, too. If you must spray, use the least toxic formulations that will get the job done.
- Work fertilizers into the soil instead of letting them lie on the ground surface exposed to the next rainstorm.

# 8 HOT TUB AND POOL CLEANING AND MAINTENANCE

Despite the fact that we immerse ourselves in it, the water from pools and hot tubs is far from chemically clean. Nutrients, pH, and chlorine can adversely affect fish and wildlife in water bodies. Following these BMPs will ensure the cleanliness of your pool and the environment.

## 8.1 BEST MANAGEMENT PRACTICES

- Pool and hot tub water should be dechlorinated if it is to be emptied into a ditch, on the ground, or a lawn or to the storm drainage system. Contact your chemical supplier to obtain the neutralizing chemicals you will need. The rate of flow into the ditch or drainage system should be regulated so that it does not cause problems such as erosion, surcharging or flooding. Water discharged to the ground or a lawn should not cross property lines and or produce runoff. If you live in a sewered area, you must discharge pool water to the sanitary sewer.
- If pool and hot tub water cannot be dechlorinated, it should be discharged to the sanitary sewer. Prior to draining, the wastewater treatment plant must be notified to ensure they are aware of the volume of discharge and the potential effects of chlorine levels. A pool service company can help you determine the frequency of cleaning and backwash of filters.

- Diatomaceous earth used in pool and hot tub filters should never be disposed of in surface waters, on the ground, into storm drainage systems or septic systems. Dry it out as much as possible; bag it in plastic and dispose of at the landfill.

# 9 HOUSEHOLD HAZARDOUS MATERIAL USES, STORAGE, AND DISPOSAL

Once we really start looking around our houses, the amount of hazardous materials we have on site is a real eye-opener. Oil-based paints and stains, paint thinner, gasoline, charcoal starter fluid, cleaners, waxes, pesticides, fingernail polish remover, and wood preservatives are just a few that most of us have around the house.

When products such as these are dumped on the ground or in a storm drain, they can be washed directly to receiving waters where they can harm fish and wildlife. They can also infiltrate into the ground and contaminate drinking water supplies. The same problem can occur if they are disposed of with your regular garbage; the containers can leak at the landfill and contaminate groundwater. The same type of contamination can occur if hazardous products are poured down a sink or toilet into a septic system or the City sewer system. Many compounds will "pass through" the wastewater treatment plant without treatment and contaminate receiving waters, or they can harm the biological process used at the treatment plant, reducing overall treatment efficiency. With such a diversity of hazardous products present in all homes in Albany County, a large potential for serious environmental harm exists if improper methods of storage, usage and disposal are employed. Using the following BMPs will help keep these materials out of our soils, sediments and waters.

## 9.1 BEST MANAGEMENT PRACTICES

- Dispose of hazardous materials and their containers properly. Never dump products labeled as poisonous, corrosive, caustic, flammable, inflammable, volatile, explosive danger, warning, caution or dangerous outdoors, in a storm drain, into sinks, toilets or drains.

- With some products, disposal can be avoided altogether if you can purchase a small volume of the material, so that none is left over. If you have extra at the end of project, you may be able to find a friend or neighbor who can use it.

- Household hazardous wastes are accepted at the Laramie landfill during the summer months

- Check containers containing hazardous materials frequently for signs of leakage. If a container is rusty and has the potential of leaking soon, place it in a secondary container before the leak occurs and prevent a clean-up problem.

- Store hazardous materials containers under cover and off the ground. Keep them out of the weather to avoid rusting, freezing, cracking, labels being washed off, etc. Hazardous materials should be stored out of the reach of children. Never transfer to or store these materials in food or beverage containers that could be misinterpreted by a child as something to eat or drink.
- Keep appropriate spill cleanup materials on hand. Kitty litter is good for many oil-based spills.
- Ground cloths and drip pans must be used under any work outdoors that involves hazardous materials such as oil-based paints, stains, rust removers, masonry cleaners, and others bearing label warnings as outlined above.
- Latex paints are not a hazardous waste but are not accepted in liquid form at the landfill. To dispose, leave uncovered in a protected place until dry, then place in the garbage. If you wish to dry waste paint quickly, just pour kitty litter in the can to absorb the paint. Once paint is dry, leave the lid off when you place it in the garbage so your garbage collector can see that it is no longer liquid.
- Use less toxic products whenever possible.
- If an activity involving the use of a hazardous material can be moved indoors out of the weather, then do so. Make sure you can provide proper ventilation, however. Follow manufacturer's directions in the use of all materials. Over-application of yard chemicals, for instance, can result in the washing of these compounds into receiving water bodies. Never apply pesticides when rain is expected.
- When hazardous materials are in use, place the container inside a tub or bucket to minimize spills.

# 10 RESIDENTIAL WELLHEAD MAINTENANCE

The following suggestions are taken from the DEQ's 1998 Rural Wellhead Protection Fact Sheet:

Existing wells must be maintained and operated correctly to prevent well deterioration and aid in preventing contamination of your water supply. Similar to your car or tractor, your well needs regular maintenance. This maintenance includes simple measures, such as, keeping the wellhead area clean and accessible, and moving any pollutants as far away from the well as possible. Other more extensive measures may involve hiring a qualified pump installer or well technician to inspect the operation of the pump and the integrity of the well casing. Many problems can be prevented by following proper well design and installation practices during the construction of the well. Your well should also be sampled regularly to verify that no contaminants are present in the water.

## 10.1 BEST MANAGEMENT PRACTICES

General procedures for protecting your water supply wells should include use of backflow preventers and plastic nurse tanks and maintaining a slope or curb that directs surface runoff away from the wellhead. Minimum maintenance on a well should include an annual check of the well and any treatment system. It is your responsibility to maintain your well in good condition to protect the quality of groundwater.

### 10.1.1 BACKFLOW PREVENTERS

If you mix pesticides or fertilizers in tanks next to your wellhead or do fertigation and/or chemigation at irrigation wellheads, a backflow prevention device is required. Fertigation is the process of adding fertilizers to irrigation water at the wellhead. Chemigation is the addition of chemicals such as pesticides to irrigation water at the wellhead. Chemigation at a wellhead is not recommended, and it may require the issuance of a Chapter III Permit from the Wyoming Department of Environmental Quality, Water Quality Division (WDEQ/WQD).

A backflow prevention device will prevent chemicals from flowing back into the well or back-siphoning, which can directly contaminate the groundwater when the well pump is turned off. Simple backflow preventers are also recommended for common household water uses such as laundry tubs, sinks, dishwashers, washing machines, and outside hydrants used to fill tanks. Maintaining an air gap between the hoses/ faucets and the well will prevent the backflow of contaminated water. Any household appliances that require a cross-connection between potable and non-potable water need to have backflow preventers.

### 10.1.2 NURSE TANKS

It is highly recommended that any fertilizers, pesticides, or other chemicals be mixed and loaded in an area that is as far away from the wellhead as feasible; a minimum distance of 100 ft. is recommended. The use of inexpensive nurse tanks is recommended to allow mixing in the field. They can be filled with water at the wellhead and transported to the field far from the wellhead for mixing. Sprayer tanks can then be filled from the nurse tanks in the field. Nurse tanks and chemical storage containers should be thoroughly rinsed before being stored or thrown away. The rinsing water should be disposed of in an acceptable manner, such as applying it to fields at normal application rates.

### 10.1.3 SURFACE WATER PROTECTION

A finished cement cap is typically placed at the wellhead. The cement cap is sloped away from the well to prevent water from surface runoff accumulating at the top of the casing. If an existing well does not have this cement cap, it is recommended that a cap be installed to a depth extending just below the frost line. The ground surface needs to be built up and mounded around the wellhead. If water accumulates and ponds in a low area near the well, berms or

curbs need to be placed in appropriate locations surrounding the well to divert runoff from the wellhead. Soil berms and mounds need to be checked periodically and repaired as needed.

### 10.1.4 WELL MAINTENANCE

Regular maintenance checks should be completed on your well. You may need to disinfect your well, pressure tanks, and distribution system. Artesian or flowing wells normally require more maintenance because the valves and casings must prevent leakage and withstand the pressure exerted by the water.

### 10.1.5 WELL DISINFECTION

Before drilling, a contractor should disinfect all bits, tools, pumps and any other material that may enter the drill hole during the drilling process. All filter pack material and drilling water should be disinfected. A common disinfection chemical treatment is chlorination, which normally requires some type of agitation to effectively kill bacteria. The contractor should also disinfect the well, pump, and piping after completion of the well. The process of disinfecting a well involves the addition of a disinfection agent, such as a form of chlorine like calcium hypochlorite or sodium hypochlorite tablets, combined with physical agitation to disinfect the entire well borehole. After agitation, the disinfecting solution should be left in the well for at least four hours. The piping, storage tanks, pump, pressure tanks, and distribution system should also be disinfected by pumping the disinfecting solution into the system and leaving it in the system for at least two hours. Before placing the well system back into service the chlorine residue needs to be flushed from the system.

### 10.1.6 WELL YIELD

Every well should have a pump test done after it is installed. The owner of the well should keep copies of these tests and any other well records. Information about your well may be available from the Wyoming State Engineer's Office ((307) 777-6150). Periodically, the well performance should be tested by measuring the highest sustainable well pumping rate in gallons per minute for a period of continuous pumping. If 10 - 15% reductions are measured in yield, the cause(s) of decreased yield need to be identified and corrected. If a 25% or greater reduction in yield is measured, the money required to fix the problems may be better applied to the installation of a new well.

The type of aquifer that a well is installed in will affect how frequently maintenance is required to increase well yields. Shallow wells located in alluvial sands and gravels will require more frequent maintenance. Municipal water supply wells in alluvial aquifers require maintenance every 2 - 5 years. Reductions in well yields may be caused by the following problems: 1) plugging of the screen or the formation around the well caused by incrustation or biofouling; 2) plugging of formation by fine particles; 3) pumping sand; 4) collapse of well casing or screen; and 5) a damaged pump.

### 10.1.7 WELL REHABILITATION

Correcting the problems described above will typically require a qualified water well contractor. Many of the problems described above may be prevented by following proper well design and installation practices. The procedure for cleaning up plugging caused by mineral deposits requires treating the well with strong acids that should only be attempted by qualified well technicians. Biofouling may be prevented by disinfecting all downhole equipment and materials during well installation. Physical plugging of wells and the pumping of sand can be prevented by proper well design and thorough well development during installation. Adding polyphosphates or surfactants added to a well, combined with thorough physical agitation will help to remove fine material from the formation. Corrosion of a well casing and screen can be prevented by using the correct well casing materials. Installation of cathodic protection may be required on existing wells to reduce corrosion rates. Well pumps may be damaged in wells without well screens and/or filter packs or wells with improperly sized well screens and/or filter packs. Replacing the pump in an improperly constructed well is not a good solution, since the new pump will eventually fail. A better alternative may be to replace the screen or place an inner screen in the well. If it is difficult and expensive to improve the performance of an existing well, it may be wiser and more economical to drill a new well.

### 10.1.8 WELL SAMPLING

Well water should be sampled on at least an annual basis. Sample your well any time you think a health problem may be caused by a disease producing microorganism in your water supply, or if you notice significant changes in the taste, smell, or color of the water. At a minimum, the laboratory should analyze for the following parameters: pH, nitrates, ammonia, total coliform bacteria, and total dissolved solids. If you suspect any other contaminants, such as hydrocarbons from petroleum leaks or spills, or spills of pesticide liquids, include these specific parameters in the test. If any parameters in your well exceed acceptable limits, always retest immediately to verify the first test.

The state of Wyoming has two state laboratories (see References/Contacts) in Cheyenne and Laramie that will analyze your samples. Your UW Cooperative Extension Service (UWCES) county office or local health department should have a current listing of local private laboratories that will also conduct water analyses.

If your water system contains over (1) coliform bacteria per 100 milliliters, it may not be safe to drink due to bacteriologic contamination. Contact a qualified well contractor to disinfect your well; tanks, and distribution system. If the sample was taken at your water tap, the bacteria may be present within your pressure tank or distribution system. Exposure of the well or piping system is sometimes necessary in order to perform various procedures such as repairs or maintenance. Please remember that whenever the well or piping system is exposed, it may be invaded by foreign matter that contains bacteria. The well system should be disinfected prior to placing it back into service.

All back-siphoning occurrences or major spills or leaks must be reported to the WDEQ/WQD. To report and receive assistance, please call the 24-hr Emergency Contact of the DEQ/Water Quality Department, at (307) 777-7501. If you are calling between 8 a.m. - 5 p.m., please ask to talk with someone concerning the spill response program.

# 11 REFERENCES/CONTACTS

## REFERENCES

### DRINKING WATER QUALITY STANDARDS

U.S. Environmental Protection Agency's Safe Drinking Water Hotline. Call toll free 1-800-426-4791 from 8:30 A.M. to 5:00 P.M. Eastern Time.

## CONTACTS

### STATE/FEDERAL AGENCIES

Wyoming Dept. of Environmental Quality, Water Quality Division, 200 West 17th Street, Cheyenne, WY 82002, (307)777-7937.

Wyoming State Engineers Office, 122 W. 25th St., Cheyenne, WY 82001, (307)777-6150.

Geological Survey of Wyoming, 1000 East University Avenue, Laramie, WY 82071-3008, (307)766-2286.

U.S. Geological Survey, Water Resources Division, 521 Progress Circle, Suite 6, Cheyenne, WY 82007, (307)778-2931.

U.S. Environmental Protection Agency, Region VIII, 1595 Wynkoop Street, Denver, CO 80202-1129, 1-800-227-8917.

University of Wyoming Water Data Systems,1000 East University Avenue, Laramie, WY 82071-3067, (307)766-6651.

### STATE LABORATORIES/ INFORMATION

Wyoming Department of Agriculture Analytical Services Laboratory, 1174 Snowy Range Road, Laramie, WY 82070. (307) 742-2984.

Wyoming Department of Health/Preventative Medicine Division - Public Health Laboratory, 208 South College Avenue, Cheyenne, WY 82007 (307)777-7431.