# Best Management Practices For Private Well Protection

Colorado State University Cooperative Extension

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# Best Management Practices for Private Well Protection

Many Colorado residents use wells as their primary source of drinking water. Unfortunately, some common activities around the home or farmstead can degrade the quality of well water.

Since wells are directly linked to groundwater, your drinking water can become seriously contaminated if agricultural chemicals, feedlot runoff, fuels, household wastes, or other contaminants accidentally enter your well. Because of this, all rural residents should view their wellhead as a vital asset that needs to be protected.

This publication is intended to help you evaluate activities around the home, farm, or ranch which may contaminate wells and groundwater. Adopting Best Management Practices (BMPs) for private wells can help protect the groundwater that your family and your neighbors rely upon.

## Potential Contaminants

While private wells must be permitted by the State Engineer, the quality of water used by well owners is not regulated. As a result, many well owners have never had their water tested to determine its suitability for drinking. Even though Colorado has groundwater standards for contaminants such as nitrate, the State does not exercise jurisdiction over the quality of the water consumed from private domestic wells. This puts the responsibility for protecting private wells on the well owner.

The typical rural home has a number of potential sources of groundwater contamination in close proximity to the wellhead. Faulty septic systems are the most common source of well water contamination, but agricultural chemicals, fuels, and animal wastes also are important concerns.

## Potential Sources of Private Well Contamination

Agricultural sources:

- Pesticide and fertilizer storage
- Pesticide and fertilizer mixing and loading
- Backsiphoned agricultural chemicals
- Animal waste stockpiles or lagoons
- Dairy barn wastes
- Livestock pens and yards
- Leaky silos or underground silage pits

Other sources:

- Septic systems
- Improper waste disposal – paints, lubricants, dead animals, and cleaning products
- Lawn and garden chemicals
- Poorly sealed wells
- Waste dumps
- Underground storage tanks
- Equipment and vehicle cleanup and maintenance area
- Fuel storage

**The BMP Approach**

**Rather than legislate overly restrictive measures on farmers, the Colorado Legislature passed the Agricultural Chemicals and Groundwater Protection Act (SB 90-126) to promote the voluntary adoption of Best Management Practices for the proper use of pesticides and fertilizers. Voluntary adoption of BMPs by agricultural chemical users will help prevent contamination of water resources and perhaps eliminate the need for further regulation and mandatory controls.**

**BMPs are recommended methods, structures, or practices designed to prevent or reduce water pollution. Implicit within the BMP concept is a voluntary, site-specific approach to water quality problems. Development of BMPs in Colorado is being accomplished with significant input from rural residents and other local experts. Many of these methods are already standard practices, known to be both environmentally and economically beneficial.**

While many farmsteads and rural homes have similar features, well water quality can vary greatly because of the vulnerability of groundwater at certain locations. Older wells in shallow aquifers are more likely to be contaminated. The soil and geologic material that comprise the overburden greatly influence the relationship between surface activities and groundwater quality. Deeper wells tend to pass through more restrictive or impermeable layers, which decrease the rate at which contaminants reach the aquifer. If possible, well owners should talk to the driller who installed their well about the hydrology of the site and ask for a copy of the well log. While all wells need protection, it is especially important to observe good management in the vicinity of a shallow or vulnerable well.

The 1990 EPA National Survey of Pesticides in drinking water wells found that about 4.2% of the rural domestic wells they monitored contained detectable levels of one or more pesticides. The EPA estimates that about 0.6% of rural domestic wells contain one or more pesticides at concentrations above a maximum contaminant level (MCL) where human health may be compromised. The EPA also estimates from the survey that about 57% of private drinking water wells contain detectable levels of nitrate ($NO_3$), while 2.4% of rural wells exceed the EPA drinking water standard of 10 mg/L $NO_3$-N.

Predicting if a well is likely to be impacted by pesticides is difficult because many factors influence the probability of contamination. Well age, location, construction, condition, geology, and management practices affect contamination potential. However, strong evidence points to pesticide storage and mixing near the well as the predominant reason for high levels of pesticide contamination when it occurs.

In Colorado, a comprehensive statewide assessment of groundwater has not yet been completed, but the Colorado Department of Health and Environment has found some elevated nitrate levels in its survey of private domestic wells.*

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*Colorado Department of Health, 1993. "Report to the Commissioner of Agriculture"

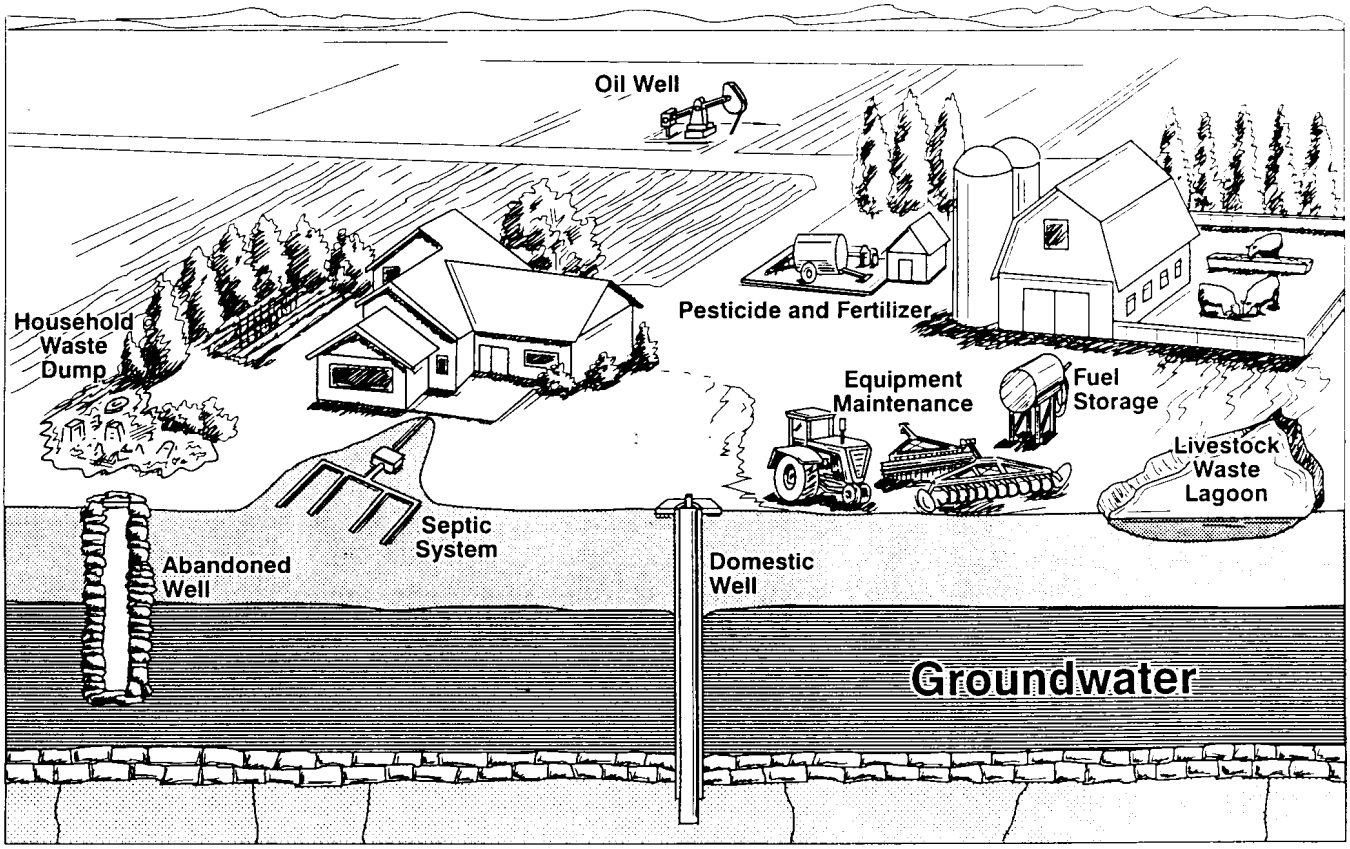


**Figure 1. The typical rural domestic well must be protected from a variety of sources of contamination**

Pesticides have also been detected in rural wells in agricultural regions of Colorado. Preventing groundwater contamination is important because, once contaminated, it is very difficult and expensive to clean up. In some cases, cleaning up contaminated groundwater is virtually impossible. Farmers, ranchers, and other property owners may have difficulty selling or mortgaging property with groundwater contamination problems.

## Well Location and Setbacks

Before evaluating management practices around your home, it is important to scrutinize the location of the well in relation to potential sources of contamination (Figure 1). Contaminants will enter groundwater by either leaching through the soil or by direct flow down the well bore. Most cases of serious groundwater contamination are caused by spills at the wellhead, backsiphoning, poor well construction and maintenance, or improper storage of hazardous products. Direct groundwater contamination can also occur through old or abandoned wells, including irrigation and oil wells.

Wells must be properly located to ensure a clean water supply. Unless otherwise protected, the well should be located on the highest ground practical, up-gradient from septic systems, feedlots, fuel tanks, and chemical storage and mixing sites. In some cases, changing well location is more cost effective than moving existing hazards. If you are installing a new well, especially in a shallow alluvial aquifer, determine the groundwater flow direction and make sure there are no visible or hidden hazards nearby, such as old dump sites or underground storage tanks. Be aware that wells can draw water from all directions, not just up-gradient. Additionally, if the aquifer supplying water to your well is deep, the groundwater may flow in a direction different than the surface slope. Finally, make sure that the well casing is properly sealed and extends above the flood level of any nearby surface water.

State regulations encourage good well location by requiring a minimum horizontal distance of 100 feet between newly constructed wells and any source of contamination. However, many agricultural practices and structures are commonly overlooked in establishing setbacks.

In theory, safe setback distances will depend upon soil type and the hydrology of the site. The difficulty of assessing the vulnerability of groundwater at a specific site has led to the adoption of uniform separation distances. Well owners are encouraged to observe greater setback distances between their wells and potential contamination sources (Figure 2). Keep in mind that the suggested setbacks are only guidelines. If your site has shallow groundwater or coarse soils, it is in your best interest to protect the well by increasing these setback distances.

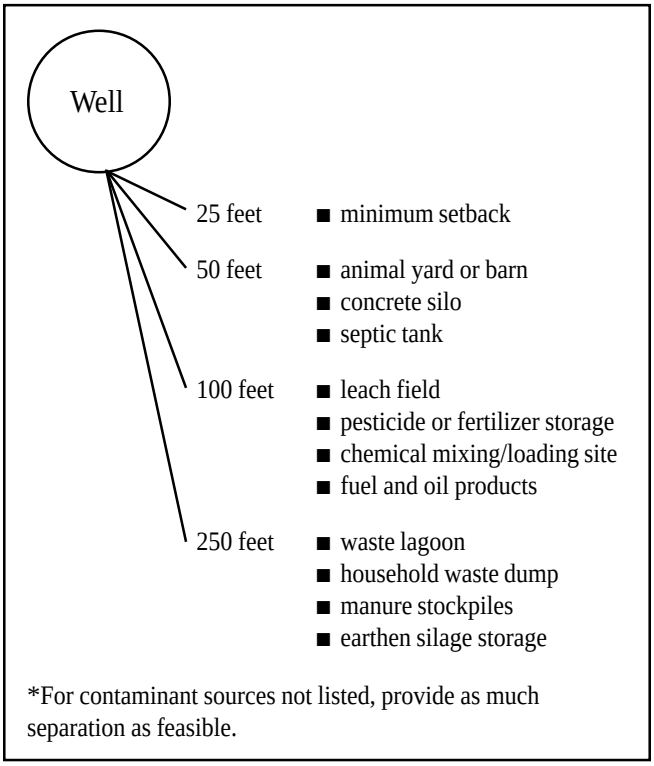


**Figure 2. Suggested minimum separation distance between wells and potential sources of contamination**

## Well Construction and Maintenance

The way a well is constructed affects its ability to keep out contaminants. New wells should be constructed with no unsealed openings around the well, and only durable, high quality materials should be used.

Three types of wells have been historically used in Colorado: large-diameter dug or bored wells, sand-point wells, and deep-drilled wells. Of these, drilled wells are by far the most common, and are least prone to contamination problems.

Information about the construction of your well is usually available from the previous owner, the well driller, or the State Engineer's Office. Older wells are more likely to have thinner casings, which may be corroded through, or they may have faulty pumps which can leak lubricating oils.

Some well problems, such as a cracked casing, are obvious upon visual inspection. Other problems are not so obvious. If you suspect a contamination problem caused by well integrity, it is best to have an inspection by a licensed driller or well service technician.

Whether you are inspecting a new well or an existing one, there are four primary features that need to be evaluated: the casing, grout, seals, and graded slope around the wellhead.

The steel or thermoplastic casing installed during construction to prevent collapse of the borehole provides the primary defense against contaminants in surface water or shallow groundwater. State regulations specify that the casing must extend 12 inches above the soil surface. If the area is susceptible to flooding, extend the casing 2 feet above the flood level. Wells that extend through a shallow aquifer to tap a deeper formation should be cased to a level below the shallow aquifer. You can visually inspect casing for holes and cracks at the surface from the outside. The upper interior of the casing can be inspected for cracks by shining a flashlight down the inside. Ask your well driller for a copy of the well log to determine the depth of casing and grout. Your local well driller should be able to help you determine if the well meets current standards.

The gap between the well casing and the bored hole must be grouted near the surface with a minimum of 10 feet of cement, according to state Water Well Rules (2CCR 402-2) to prevent surface water from directly entering the aquifer. If you can move the well casing around by pushing against it, you may have a problem with the grouting near the surface.

To prevent any contamination from the top of the well, the well should be capped with a tight-fitting, vermin-proof well cap. All points where electrical wiring, pipes, or observation equipment enter the well should be tightly sealed. Whenever the well cap is removed, bacteria may enter. To prevent bacterial contamination, disinfect your well with a 100 mg/l chlorine solution any time the system is opened for maintenance or repair. Contact your local health department or water well contractor for complete information on disinfecting your well.

## Abandoned Water Wells

As larger farms have consolidated small farms and old homestead sites, and as municipal water supplies reach rural areas, many older wells are no longer needed. These abandoned water wells are often neglected or forgotten. Wells no longer in use present safety hazards, as well as groundwater hazards.

Old wells can allow polluted runoff water to flow directly down to the aquifer, bypassing the natural filtering that normally takes place in the soil. Additionally, poor quality groundwater can degrade higher quality groundwater if the two are allowed to mix via an old, poorly constructed well.

Property owners may not even be aware that abandoned wells exist on their land. This can be dangerous for small children and pets. The most obvious sign of an old well is a pipe sticking out of the ground. A unexplained

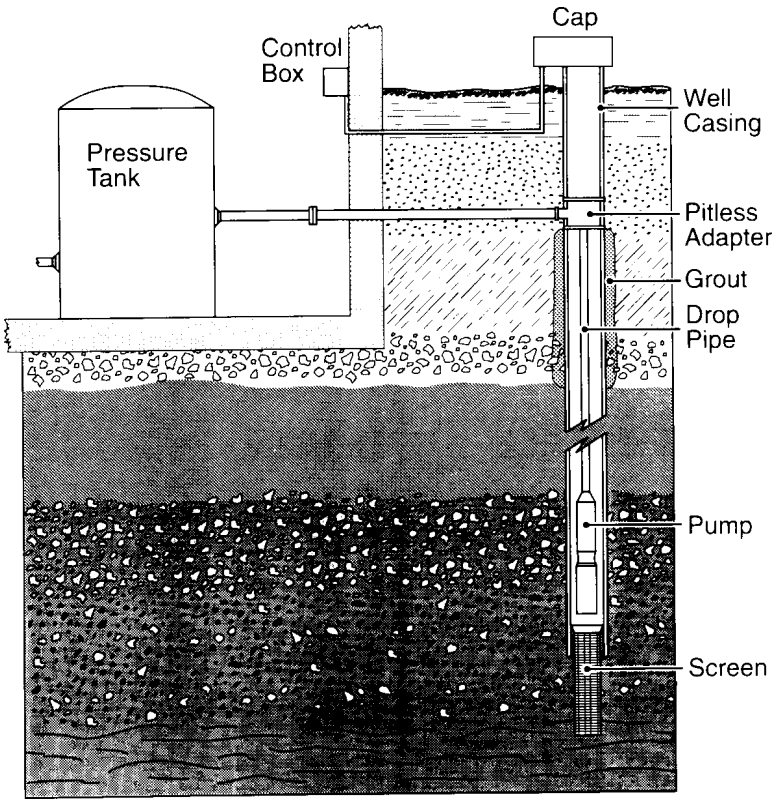


**Figure 3. Cutaway of a private domestic well**

depression in the ground at an old homesite, or an old pumphouse, are indicators of abandoned wells. In some cases, landowners can ascertain the location of abandoned wells from old photos or records. Windmills are often located over abandoned wells.

The best solution for these unwanted wells is not to merely cap or cover the well, but to permanently seal it. The idea behind the proper sealing of a well is to restore the relationship of the aquifer to the surrounding material that existed before the well was drilled. Achieving this result is not always a simple procedure.

Sealing begins by removing all pumping equipment and clearing debris from the well. The well is then back-filled with clean sand, gravel, or other chemically inert material. Wells that penetrate more than one aquifer are sealed by placing a 20 foot grout plug of nonshrink concrete or bentonite-cement at the confining layer above each aquifer. A professional well driller will often use a tremie tube to apply the sealant in the well bore without diluting the mixture. The well casing is completely filled with chemically inert materials, cut off below the ground surface, and capped with a permanently attached, water-tight cover. Check the Water Well Rules for requirements on plugging and sealing unused wells.

## Water Testing

People who get their water from a public supply have the benefit of strict federal and state regulations governing water quality and testing. If you have a private water system, you are your own regulatory agency. It is your responsibility to make sure your family's water is safe. Contaminated water does not always taste, look, or smell different from safe drinking water. Laboratory analysis is the only sure method to determine the quality of your water.

If you are buying a new property or if you cannot remember when your well was last tested, you need to have your water analyzed by a reputable lab for bacteria, nitrate, sulfate, chloride, pH, total dissolved solids (TDS), hardness, and conductivity to get baseline information on your well. Tests for pesticides, other organic contaminants, and radon are expensive and not usually recommended unless you have reason to suspect contamination.

Annual water testing is suggested to help monitor the quality of your private water supply. If you see a decline in quality, more thorough investigation and more frequent testing is warranted. These records will be valuable if your water is ever contaminated by some off-site activity, such as oil and gas drilling in the vicinity of your well.

In addition to routine water quality testing, special circumstances may warrant more detailed analyses. You should consider having your well tested if:

- *Family members or guests suffer gastrointestinal illness.*
  Test for bacteria, nitrate, and sulfate.
- *You live near a dump, landfill, factory, or cleaning operation.*
  Test for volatile organic compounds (VOCs), TDS, heavy metals.
- *You live near a mining operation.*
  Test for pH and metals.
- *There is oil and gas drilling activity nearby.*
  Test for chloride, sodium, strontium, and barium.
- *You live near an old underground storage tank.*
  Test for hydrocarbons and volatile organic compounds.
- *Someone in your family is expecting a baby or has respiratory disease.*
  Test for nitrate.
- *Your plumbing contains lead pipe, fittings, or solder joints.*
  Test for lead.
- *Water leaves a scaly residue or soap scum and decreases cleaning action of detergents.*
  Test for hardness.
- *You have a spill of agricultural chemicals or petroleum products on or near the farmstead.*
  Test for the appropriate chemical.

Prior to taking a water quality sample, contact the testing lab or your county Extension Agent for sampling instructions. Most labs provide clean containers with detailed instructions on how to take the sample. Be sure to follow all instructions and return the water sample to the lab as soon as possible. If you have to mail the sample to the lab, draw the sample on Monday morning so it can be analyzed the same week. For best results, water samples should be analyzed within 30 hours of the initial collection.

Keep a record of water tests as a reference for future testing. If you need help interpreting the results of your sample, the lab manager where the sample was analyzed or your county Extension Agent can assist you.

## Management Strategies to Minimize Contamination Risks

Properly located, constructed, and maintained wells are the first line of defense against contaminants. However, good management around the well is also essential to keeping your drinking water clean.

### Pesticides

Pesticide contamination of drinking water is not common in Colorado, but it is a serious problem when it does occur. Once groundwater is contaminated by pesticides, it may take many years or expensive cleanup before it is potable. In the past, farmers commonly handled pesticides near their well for convenience. That was before it became widely known that these chemicals could reach groundwater before they were decomposed. Today, pesticides should not be stored or handled near the farmstead wellhead. Be aware that irrigation wells are often hydrologically connected to the farmstead well. If your chemigation system fails to protect your irrigation water, it may end up contaminating your drinking water also.

Routine pesticide spills that occur during mixing can add up over time if you continually mix in the same place. Rather than mix and load these chemicals at the farmstead, a better practice is to mix chemicals at the site of application using a nurse tank. If you must use the farmstead well to fill spray tanks, be sure to equip faucets with backflow check valves and use a long hose to stay away from the wellhead. Finally, clean your spray equipment in the field, if possible. Do not routinely wash down sprayers near the well. (For further information, see *BMPs for Pesticide and Fertilizer Handling and Storage*.)

### Fertilizers

Nitrate contamination of rural domestic wells can come from nearby crop fields, animal wastes, and wastewater systems. Fertilizers can cause nitrate contamination of rural water systems if they are handled or stored too close to the well. Nitrate is very mobile and will leach to groundwater much more rapidly than pesticides. Crop producers should observe the same precautions for fertilizer handling near the well as for pesticides.

Water tests for nitrate are an inexpensive way to routinely check your water supply. If you handle large amounts of fertilizer at your farmstead, or if you have confined animals nearby, it is recommended that you have a water sample analyzed for nitrate every year. Inexpensive test kits are available for those who wish to test their own water.

### Livestock Waste

On-farm storage of livestock waste is an important management technique that allows producers to dispose of manure in an environmentally sound way. However, waste storage facilities must be properly designed and managed to avoid contaminating water supplies. Animal wastes can be a source of microbial pathogens, as well as nitrate. Keeping these pathogenic organisms out of drinking water is essential for your family's health.

If you store animal wastes on or near the feedlot, locate the lot at least 250 feet away from the well. Sandy soils, shallow groundwater, or sink holes increase the vulnerability of your well to contamination by animal wastes. Make provisions to collect or divert runoff water from the feedlot and the manure stockpile away from all water sources. In addition, apply the wastes at agronomic rates to cropland frequently enough to avoid excessive accumulation on the farmstead.

Liquid waste storage structures must also be located a safe distance away from wells and surface water. Liquid-tight storage structures should be 100 feet from wells; earthen structures should be at least 250 feet away. Anaerobic lagoons, runoff storage ponds, and earthen storage basins should be constructed on clay soils or be sealed with bentonite or plastic liners to minimize seepage. Structures older than 10 years should be inspected each time they are dewatered to determine if cracks, erosion, or worm channels are allowing leakage. If a pit designed to hold the wastes

accumulated over a specific time (for example 90 days) continues to accommodate waste loads for a much longer period, the operator should suspect leakage and take immediate steps to correct the problem.

Water tests for bacterial contamination are inexpensive and are available from your local health department. These tests are highly recommended on all farmsteads that have confined animal feeding operations. Positive results on a routine bacterial test are often an indication that more serious pathogens have compromised your drinking water.

**Septic Systems**

Rural homes that have domestic wells typically have household wastewater treatment systems also. These septic systems, while usually reliable, are the most common cause of domestic well water contamination. Septic systems that are adequately sized and located according to state code, with a suitable soil adsorption field, will usually provide good service if you maintain the system regularly. Well owners in mountainous terrain should be aware that septic systems located on thin soils over fractured rock are more likely to impair water quality. These systems require good maintenance and well water should be regularly tested for microbial contamination.

Homeowner maintenance of septic systems will help prevent contamination of groundwater and the spread of disease. If you have an old septic system which you suspect is not functioning adequately, or if the system backs up or emits odors, have a plumber or engineer inspect the system to determine if it is properly designed and functioning.

To keep your system operating correctly, observe the following maintenance practices.

- Monitor the tank volume annually, and have it pumped out every couple of years, or more frequently, if needed.
- Reduce wastewater when possible and avoid overloading the system on any particular day.
- Do not dispose of any caustic or hazardous chemicals in the toilet or in your drains.
- Install a lint trap on your washing machine to reduce lints that can clog the septic system.
- Know the location of the septic tank and leach field, and do not drive heavy vehicles over them.
- Avoid planting trees or large shrubs near drain lines.

Excessive water use, water softeners, and garbage disposals put additional demands upon household wastewater treatment systems. Consider ways to minimize these loads on your system or be prepared to pump the tank out more frequently. Letting the tank overload reduces the time wastewater remains in the tank, resulting in premature failure of the absorption field and possible well water contamination.

**Petroleum Products and Household Hazardous Wastes**

A couple of quarts of gasoline may be enough to contaminate your entire supply of drinking water. If you have underground storage tanks on your property, the best policy is to have them removed now – before they cause groundwater contamination. Above-ground gasoline and diesel storage tanks are less likely to cause groundwater contamination because you can easily monitor their integrity.

It is important to locate all fuel tanks as far from your well as practical. Fuel leaks and spills migrate rapidly through soil to groundwater. Therefore, landowners with sites having very permeable soils and shallow groundwater should consider installing above-ground tanks on impermeable pads with secondary containment. If you have a fuel spill or leak, contain the spill immediately and contact your local fire department.

Farmers often use large amount of lubricants, solvents, and cleaning products. These chemicals are an unavoidable part of agricultural businesses, but they are also potentially hazardous to your health if they contaminate the farm well. The area where vehicle maintenance is performed should be as far from the well as feasible. Solvents and waste oil should be stored separately in their original containers until they can be taken to a collection facility. Do not dispose of these chemicals on your property or use them for dust or weed suppression. Purchase only as much of these products as you will use in one season to reduce the amount stored at the farm.

Paints, lead acid batteries, household cleaning products, and lawn care chemicals are often overlooked as potential sources of contamination. These products should be stored on impervious surfaces, a safe distance from the well. Try to buy only the amount of these products needed to avoid problems associated with storage and disposal.

As a general practice, minimize or eliminate the disposal of all wastes and trash on your property, except those organic wastes (household garbage, lawn clippings, etc.) that can be composted or burned. Do not burn empty pesticide or other chemical containers. They should be disposed of according to the label or at an approved solid waste facility. Careless storage and disposal of potentially hazardous wastes can seriously compromise the quality and value of your property.

## Dealing With Contaminated Water

If you suspect that your well is contaminated, use an alternative source of drinking and cooking water until your well water is tested. Try to determine the source of contamination and remove it if it is on your property. If you need help locating the source of contamination, contact your county health department, your county Extension Agent, or your Natural Resource Conservation Service technician. Isolate the source of contamination and drink bottled or treated water until well water quality is restored.

**Private Well Protection Checklist***

| | Yes | No |
|---|---|---|
| Have you had your well water tested within the last two years? | ❑ | ❑ |
| Is your well less than 20 years old? | ❑ | ❑ |
| Is the water table around your well deeper than 30 feet? | ❑ | ❑ |
| Is your well securely capped and does it have intact casing which extends 1 foot above ground level? | ❑ | ❑ |
| Is your well properly grouted to prevent entry of surface water? | ❑ | ❑ |
| Do you mix, load, or store pesticides or fertilizer at least 100 feet from the well? | ❑ | ❑ |
| Do you have backflow prevention devices installed on all faucets used to fill spray tanks? | ❑ | ❑ |
| Are feedlots and lagoons located at least 100 feet away from the well? | ❑ | ❑ |
| Is your leach field at least 100 feet from the well? | ❑ | ❑ |
| Are abandoned wells on your property properly sealed? | ❑ | ❑ |
| Have all underground storage tanks been removed? | ❑ | ❑ |
| Are all fuel tanks at least 100 feet from the well? | ❑ | ❑ |
| Do you dispose of pesticide containers, solvents, lubricants, paints, household cleaning products, and old batteries in a way that will not pose a risk to your drinking water? | ❑ | ❑ |

* If you answer no to any of these questions, your well may be vulnerable to contamination. Consider having your water tested and evaluate how you can improve the safety of your water supply.

In some cases of groundwater contamination, the only viable option is to find an alternate source of household drinking water. Drilling a new well is expensive, but may be the best solution if the source of contamination is localized or there is a deeper aquifer that is uncontaminated. Connecting to municipal water supplies is becoming a feasible option for many rural homes in Colorado. In other situations, the best option may be to permanently use bottled water for drinking and cooking.

Many contaminants, especially minerals and salts, can be corrected with a household water treatment system. Have your water tested by someone who is not selling treatment devices prior to buying one. Make sure you know what contaminants you want to get rid of and keep in mind that no single system can correct all water quality problems. All of these systems have limited life expectancies and require routine maintenance. Unfortunately, many private well owners have been victimized by unscrupulous salespeople with water treatment scams. Check with your local Better Business Bureau before you purchase a water treatment device.

**Water treatment methods for private water systems***

| Treatment method | Contaminants removed | How it works | Limitations |
|---|---|---|---|
| Cation or anion exchange (water softeners) | Barium, radium, iron, magnesium, calcium | Sodium exchanged for calcium and magnesium | Sodium may cause health problems |
| Activated carbon filters | Volatile organic compounds, some pesticides, radon, mercury, odors | Water filtered through carbon granules | Must replace filters regularly |
| Chlorination | Bacteria and other microbial contaminants | Chlorine metered into water | Chlorine by-products may be harmful or affect taste of water |
| Distillation | Radium, odors, heavy metals, salt, nitrate, off-tastes | Evaporation/condensation | Slow, energy intensive, expensive |
| Reverse osmosis | Radium, sulfate, nitrate, calcium, magnesium, slats, some pesticides and VOCs | Membrane filters dissolved impurities | Expensive, slow, wastes water |
| Mechanical filtration | Dirt, sediments, scale, insoluble iron and magnesium | Sand or other filtering material strains impurities | Does not remove dissolved contaminants |
| Ultraviolet radiation | Bacteria and other microbial contaminants | Water passes under a special UV light | No residual effect; may not work in cloudy water, slow |
| Ozonation | Bacteria and other microbes | Water exposed to ozone gas | Equipment is expensive; no residual effect |
| Oxidizing filters | Iron, manganese, hydrogen sulfide | Contaminants removed through filtering and chemical reactions | Potassium permanganate is caustic |

*For more information, see Private Water Systems Handbook, MidWest Plan Service-14.

# Best Management Practices for Private Well Protection

*Guidance Principle:* Protect wellheads from potential sources of contamination.

Select the appropriate BMPs to protect your private water supply based upon cost, feasibility, and overall benefits of the protective measure. Remember, it is your responsibility to make sure your family's drinking water is safe.

8.1 Conduct a survey of your property to determine what potential water quality hazards lie within the vicinity of your well and take appropriate steps to remove or reduce these hazards.

8.2 Inspect the condition of the well cap, casing, and pad at least annually.

8.3 Repair cracked well casings, failed grout, or seals to prevent groundwater contamination.

8.4 Install backflow prevention devices on all faucets used as a water source for pesticide or fertilizer mixing.

8.5 Mix pesticides and fertilizers in the field where they will be applied or on an impervious pad.

8.6 Store all hazardous chemicals on an impervious surface, a safe distance downhill of the well.

8.7 Implement setbacks of at least 100 feet between wells and areas where fuels and agricultural chemicals are handled.

8.8 Purchase household and agricultural chemicals only as needed to avoid problems associated with storage and disposal.

8.9 Do not dispose of any potentially hazardous waste or waste containers on site.

8.10 Keep animal waste stockpiles and lagoons at least 100 feet away from wells.

8.11 Sample well water periodically and have water analyzed for nitrate, bacteria, and other pertinent water quality constituents.

8.12 Plug and seal unused wells according to state abandonment standards (2 CCR 402-2).

8.13 Monitor and maintain septic systems regularly to ensure proper functioning.

## Water Quality Agencies and Contacts

For more in-depth information about private well protection or specific inquires about BMPs, contact your local health department or one of the following agencies. They have publications, programs, and specialists that can help you protect your drinking water.

**State Agencies**

**Colorado State University – Cooperative Extension:** This branch of the university has water quality projects, educational programs, and water quality specialists. (303) 491-6281

**Colorado Department of Public Health and Environment – Water Quality Control Division:** This state agency has the primary responsibility for managing water quality in Colorado. They conduct monitoring programs and enforce health and drinking water standards. (303) 692-3500

**Colorado Department of Agriculture – Division of Plant Industry:** The Department of Agriculture has responsibility for regulation of fertilizers and pesticides. (303) 239-4141

**Office of the State Engineer:** The State Engineer is charged with administering and distributing the waters of the state. Water supply wells are regulated through the state engineer's office. (303) 866-3581

**Office of the State Engineer – Board of Examiners of Water Well Construction and Pump Installation Contractors:** This state agency has responsibility for licensing well drilling and pump installation contractors and establishing construction standards for water wells. (303) 866-3581

**Federal Agencies**

**U.S. Environmental Protection Agency (USEPA)-Region VIII:** The EPA has national responsibility to implement the Clean Water Act, FIFRA, and the Safe Drinking Water Act. Grants and cost sharing are provided to Colorado to help protect water quality. (303) 293-1413

**U.S. Geological Survey (USGS)** – Water Resources Division: The USGS assesses water availability and quality and prepares resource materials. (303) 236-9949

**USDA Natural Resource Conservation Service (NRCS):** The NRCS provides cost sharing and technical assistance on plans and projects for soil conservation and water quality programs on Colorado farms and ranches. (303) 236-2913

**EPA Safe Drinking Water Hotline:** This toll-free number provides information on hazardous chemicals and can refer you to a water-testing lab in your area. (800) 426-4791

**Related source material available from Colorado State University:**

| | | |
|---|---|---|
| **SIA** | **.513** | **Domestic water quality criteria** |
| **SIA** | **.517** | **Nitrates in drinking water** |
| **SIA** | **2.801** | **Chemigation: recommended safety devices** |
| **SIA** | **9.728** | **Drinking water treatment devices: filters** |
| **SIA** | **9.729** | **Drinking water treatment devices: distillers** |
| **XCM-178** | | **Best Management Practices for Pesticide and Fertilizer Handling and Storage** |

**Other source material:**

**Farm Bureau's Water Quality Self-Help Checklist**

**Private Water Systems Handbook. MidWest Plan Service-14**

**Onsite Domestic Sewage Disposal Handbook. MidWest Plan Service-24.**