

Granular activated carbon filters

Uncontaminated well water is usually considered to be a safe source of drinking water. When a well becomes contaminated, a water treatment system (a filter with granular activated carbon, or GAC) is a proven method for removing organic chemicals like trichloroethylene (TCE) and perfluoroalkyl substances (PFAS) from the water. When contaminant levels in a well exceed health-based limits, the Minnesota Pollution Control Agency (MPCA) may install a whole-house GAC filter. This filter traps the contaminants so that your drinking water meets health-based limits. This fact sheet is intended to provide you with information about the filter and steps you can take to ensure it operates properly.

What is GAC?

Granular activated carbon is made from raw organic materials, such as coconut shells or coal, which are high in carbon. Heat is used to activate the surface area of the carbon. The activated carbon removes certain chemicals from the water passing through a GAC filter by trapping the chemical in the GAC. However, other chemicals, like iron and nitrate, are not attracted to the carbon and therefore are not effectively removed.

It is important to know the level of contaminants and the volume of water used in order to determine the correct size and components of the filtration system. All treatment systems require proper installation, periodic monitoring, and maintenance. Eventually, the GAC loses its ability to trap and remove chemicals and it needs to be changed. The MPCA determines when MPCA-installed filters need to be changed. In some cases, the GAC can last several years depending on contaminant levels and water use.

About your GAC filter system

A whole-house filter is installed at a point on the home's water supply plumbing which will result in treatment of all water that travels to any faucet or fixture in the home. Typically, the MPCA will exclude outside faucets and sprinkler systems. It removes the chemicals before they are ingested, inhaled, or absorbed through the skin during washing or bathing. This is important for some chemicals that readily evaporate from water or easily pass through the skin.

The filters are usually cylindrical in shape and about four feet tall and 15 inches in diameter. These filters are usually installed as a pair, although more may be required in some situations. Two filters arranged in sequence ensure that any organic chemical that might get past the first filter is trapped by the second. When the MPCA recommends a filter be changed out, the second filter is moved to the first position and a new filter is placed in the second position. Often MPCA contractors will perform the change-outs. Sample ports located before, between and after the filters allow for testing of the water at each location (see diagram).

Systematic monitoring and a maintenance schedule based on contaminant levels and water use are essential to ensure that the GAC filters function properly and that a change-out occurs before the system loses its ability to trap chemicals.

Typically, a simple water meter is installed with the GAC filter to monitor water use. The MPCA will contact you periodically for a meter reading. This is critical to properly monitor the performance of the GAC filter system.



Photo of GAC System

What can I do to ensure that my drinking water remains safe?

The GAC filter system is designed to remove the contaminants detected in your well water. However, there are some important steps you need to take to ensure that the filter continues to operate properly:

- Consider testing your unfiltered well water once a year for nitrate and coliform bacteria. These are common contaminants in private wells, often resulting from septic systems or fertilizer use. Your county public health department may be able to provide you with a simple test kit. Please provide a copy of the results to your MPCA staff contact.
- If a test detects coliform bacteria and you need to chlorinate (“shock”) the well to kill the bacteria, you may need to temporarily bypass the filter system to prevent the chlorine from quickly using up filter capacity. Talk to your MPCA staff contact for guidance before doing this.
- Allow the MPCA or its contractor to collect a sample or conduct maintenance on the system when the MPCA deems it necessary, and provide the MPCA with meter readings when asked. This is very important to monitor and ensure continued filter system performance.
- If you are away from home for a week or more, thoroughly flush the system by completely opening a filtered tap or faucet for at least 30 minutes before using any water for drinking or cooking purposes. This will help remove any bacteria or other contaminants that may have built up while the GAC filter system was not in use. Although rare, bacteria in the system can convert nitrate to nitrite, which can be especially toxic for infants and young children.
- Check your system on a monthly basis to ensure that there are no leaks, or that the system has not been accidentally bypassed (allowing untreated water to reach the taps). Report any problems, changes in water pressure, or unusual taste, odor or appearance to your MPCA staff contact.
- If you are installing other types of water treatment units, such as a water softener or reverse osmosis unit, please work with the MPCA to ensure that the additional systems do not compromise the operation of the GAC filter system.

Properly maintained, the GAC filter system will provide drinking water for you and your family that meets health-based limits for the contaminants found in your well.

Contact information

If you have questions or concerns regarding the installation or operation of the GAC filter system, contact the MPCA staff person who is assigned to your project. The MPCA general telephone number is 651-296-6300 or 800-657-3864.

If you have questions regarding health concerns associated with contaminants in drinking water, please contact the Minnesota Department of Health’s Site Assessment and Consultation Unit at 651-201-4897 or health.hazard@state.mn.us.

