



**Maryland**  
Department of  
the Environment

# FACTS ABOUT: GRANULAR ACTIVATED CARBON (GAC) AT PETROLEUM CONTAMINATED PROPERTIES

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## **What is Granular Activated Carbon**

Activated carbon is made from materials such as petroleum coke, bituminous coal, lignite, wood products, coconut shells, or peanut shells. Activation is achieved in a process where steam and high temperatures come in contact with the material producing a carbon substance with many small pores. The activated carbon is crushed to produce a granular or pulverized product. Small pores in the granular activated carbon (GAC) increase the surface area of the material, allowing certain compounds/contaminants attracted to the carbon to be adsorbed onto the carbon. The efficiency of the adsorption process is influenced by the characteristics of the carbon and the contaminant as well as the amount of water pumped through the filter.

Different types of carbon remove different contaminants and no one type of carbon removes all contaminants. Activated carbon filters will not remove microbial contaminants, calcium, magnesium, fluoride, nitrate and many other compounds that are highly soluble in water. However, most carbon compounds, such as those found in gasoline and oil, are removed effectively.

## **Recommended GAC System**

A Point-of-Entry Treatment (POET) System is a system that treats the water supply because it is connected to the well water supply line as it enters the home or business. This system is recommended for most petroleum contaminated situations. A POET system typically consists of two 2-cubic foot fiberglass reinforced GAC filters, approximately 12-inch diameter by 48-inch high, piped in series with sampling ports installed before the first filter, in-between the two filters, and after the second filter. Once the POET system is installed, a sampling schedule is set up to collect samples pre-, mid-, and post-treatment. The schedule of sampling is based on the concentration of the contamination of interest and the amount of water used in the home or business. The sampling frequency will be adjusted as the system's historical efficiency is developed.

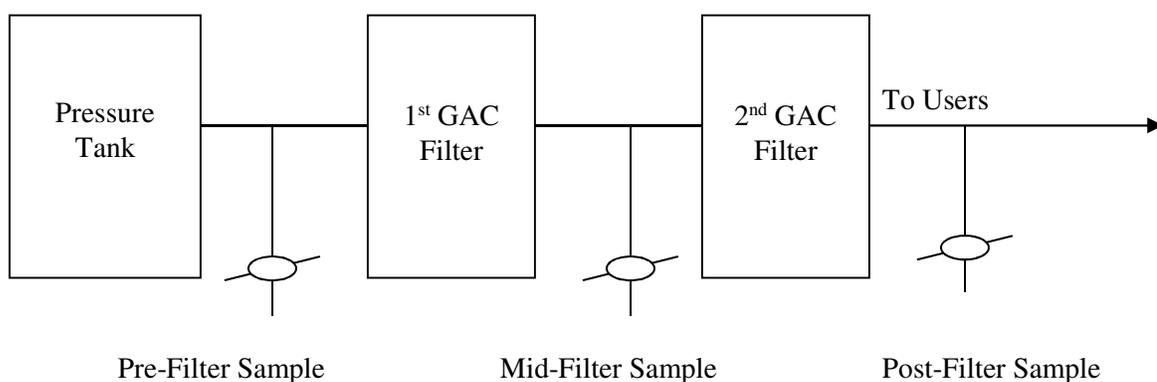
Some drawbacks associated with the use of a GAC unit include pressure decline, staining of water fixtures, and change in taste. These items can normally be addressed through the proper choice of carbon material and system service. The Department recommends changing/servicing the filters at least once every 18 months to avoid potential bacteria buildup and to ensure proper water pressure be maintained in the home. We further recommend the use of virgin coconut shell carbon as the filter media.



### **Criteria for GAC System Installation**

The Maryland Department of the Environment's Oil Control Program (OCP) may require the installation of a GAC system when sampling results from a potable water supply well report the detection of petroleum related contaminants at concentrations exceeding federal or State maximum contaminant levels (MCLs) or other applicable State standards (i.e. State Action Level or applicable risk-based standards). In most instances, the requirement to install a GAC system is made when both initial sample and confirmation sample results indicate the exceedance of regulatory standards. In instances where sampling results are below regulatory standards, the installation of a GAC system is typically not required by the OCP, but well owners may elect to have one installed.

### **Schematic Diagram of a Typical Point of Entry GAC System**



### **Criteria for GAC System Removal**

Removal of a GAC system is typically permitted by the OCP when pre-filtration sampling results indicate non-detection of all federal and State regulated compounds analyzed for a period of a least one year (12 months), based on a minimum of 3 sampling events using EPA Method 524.2. GAC system removal may be considered by the OCP if sustained low-level detections of federal and State regulated compounds are documented at concentrations below applicable groundwater standards for a period of at least two years (24 months), based on a minimum of 5 sampling events using EPA Method 524.2.

If you have questions about GAC filtration systems, call the Oil Control Program at 410-537-3443.

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