Specialized Systems

PFOS/PFAS Treatment Systems

Application:

PFOS / PFAS Removal from ground water drinking sources

System Design:

Application Specific and Customizable by H&T

Date: 2020

Additional documentation:

www.Hungerfordterry.com

Sources of PFOS/PFAS:

PFOS & PFAS can be found in many of our everyday consumer goods and on one hand has made our world better.

- Fire Fighting Foams
- Food Packaging
- Adhesives
- Cosmetics
- Non-stain Fabric coatings

These were all deemed as miracles of modern science, but on the other hand it has produced a health concern that can now be found across the world.

- Reproductive and developmental side effects
- Low Infant birth weights
- Cancers (from PFOA) including: bladder, prostate, liver and thyroid.
- Restricted Liver and Kidney function
- Thyroid hormone disruption (from PFOS)

Fortunately there is a treatment process to remove this contaminant from the ground water which has become a major concern for municipalities here in the USA.

Two of the currently acceptable technologies for PFOS/PFAS treatment in ground water is either GAC (Granulated Activated Carbon) or Selective Ion Exchange resin which are incorporated into a pressure vessel system design.

Hungerford & Terry has the ability to produce custom engineered systems complete with PLC controls and all necessary ancillary equipment to treat ground water sources containing PFOS/PFAS.

Hungerford & Terry can supply either GAC or Selective Ion Exchange technology depending on the water quality and competing constituents in the raw water.

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Treatment Options:

When considering the best possible treatment system for PFOS/PFAS removal, the raw water quality data determines the most efficient technology suited for the particular application due its own unique characteristics. Hungerford & Terry has focused on the most cost effective and efficient design using either GAC "Granulated Activated Carbon" or "Selective Ion Exchange" technologies. In both cases they are "single use" applications of the media, which means it is replaced upon reaching break through.

When considering ***GAC***, the water quality and background organics must be considered which include TOC, as Carbon is not selective to other constituents in the raw water. Background organics compete for adsorption against PFAS by "blinding off" smaller pores in the media, which may more readily adsorb to the carbon. When higher TOC are present Lignite may have longer bed life than Bituminous coal GAC.

The choice of ***Selective Ion Exchange*** has some considerable advantages over GAC in performance and operation, but the resin does have a higher initial per cu/ft cost. The higher cost resin can be offset by the higher loading rate which allows less media and smaller vessels than GAC. Pretreatment with a 5-10 micron bag filter is recommended and it removes the need for backwashing.

Comparison	GAC	Ion Exchange
EBCT	10-15 min.	1.5 - 3 min.
Bed Depth	7- 12 ft	3-5 ft
Vessel Height	Taller for EBCT & 40% Freeboard space for backwashing	Shorter due to lower EBCT and no backwashing required
Media Cost	Lower cost but requires more	Higher cost but requires less
System Footprint	Typically larger footprint due to higher EBCT requirement	Typically smaller footprint due to lower EBCT
Effluent Goals	Limited capacity for reducing short-chain PFAS to ND	Higher capacity in reducing short & long-chain PFAS to ND. Limited capacity for short-chain carboxylates like PFBA

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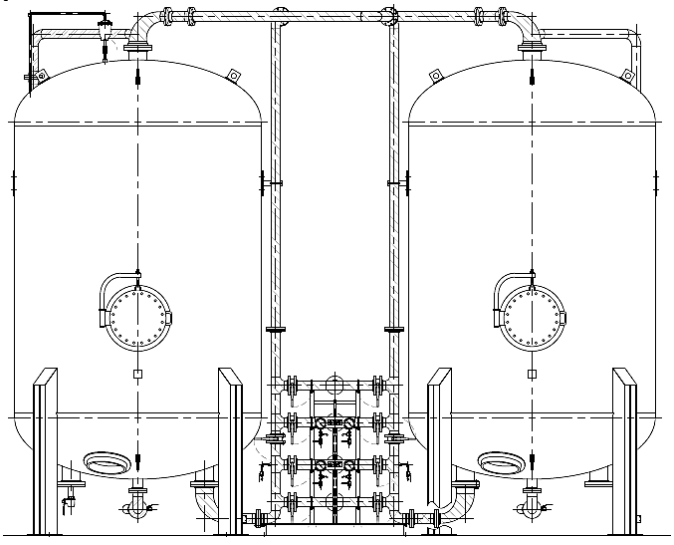
System Design:

In both GAC & Ion Exchange, the typical configuration is a “Lead-Lag” piping arrangement rather than a single vessel design.
Lead-Lag provides the ability to run continuously for a longer period of time using the “Lead” vessel up to the MCL point before switching to the “Lag” vessel. This will provide lower operational costs and higher system performance
Installing sample taps on the vessels at the 25-50-75% bed level points, allow monitoring of media performance and assist in planned maintenance schedule for media replacement.
Due to the long run times, the typical filter piping system will utilize manually operated valves to save on cost since they will be in the same position for many months. It is possible to provide fully automated controls if required.

H&T engineers provide custom water treatment systems, so any specific piping arrangement required by the client can be supplied. Below is a typical Lead-Lag filter design.



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For over 111yrs H&T, a established American company, has provided water treatment systems world wide in either small skid mounted systems or large job site assembled solutions.

Our employee owned company has designed, engineered and fabricated over 13,000 contracts for clients around the world.

At H&T, we take personal pride in our quality as well as our customer service and our companies reputation backs that up.

Skid Mounted

Green Meadows

Since 1909 in Clayton NJ, Hungerford & Terry Inc. sets industry standards in engineering, design and manufacture of innovative and efficient water treatment systems.
Systems include removal of Iron, Manganese, Arsenic, and Radium; High-efficiency / low-waste Nitrate removal; PFOS/PFAS, Color removal, Chrome-6 removal, Perchlorate removal, Degasifiers Towers, Condensate Polishers and complete Demineralizers for Boiler Feedwater in the Energy sector.