



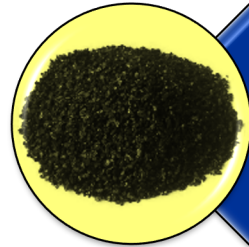
Case Study: Westfield, MA – GAC From Study to Construction

Site Overview

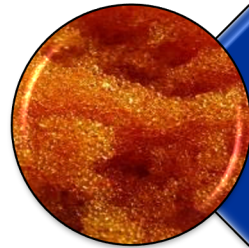


PFAS Treatment

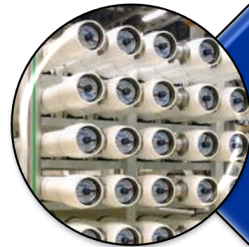
- Available treatment technologies for PFAS removal:



Granular Activated Carbon (GAC)



Anion Exchange (AIX)



Membrane

GAC vs. AIX - What Do We Know?



GAC



AIX

10 minute Empty Bed Contact Time (EBCT)

2 to 3 minute EBCT

Larger & taller infrastructure footprint

Smaller & shorter infrastructure footprint

GAC media is less expensive

IX media is more expensive

Well established technology

Not as extensively practiced as GAC

Initial backwash is required

Backwashing not recommended. Initial rinsing is required.

- Both generate spent media requiring off-site reactivation or incineration
- Effectiveness for removing longer chain and shorter chain PFAS must be confirmed using the site-specific water
- Pretreatment may be needed for both technologies to increase media life span

Bench-Scale Testing

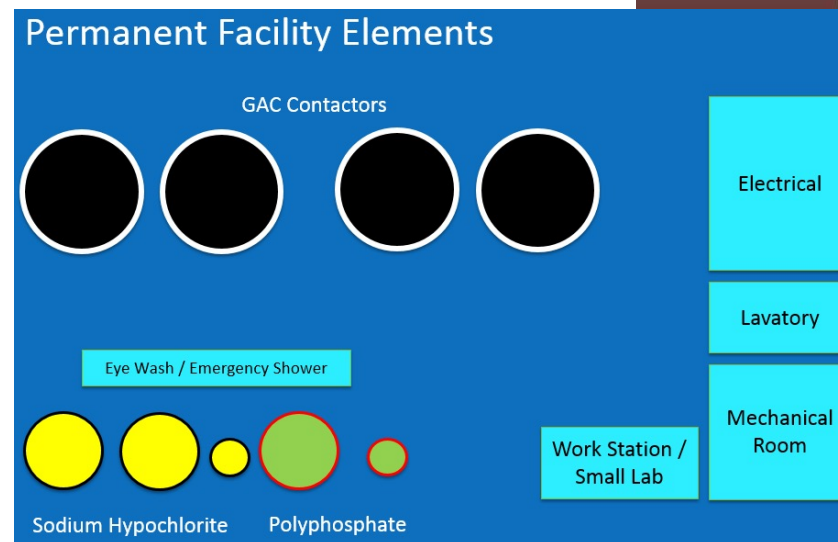
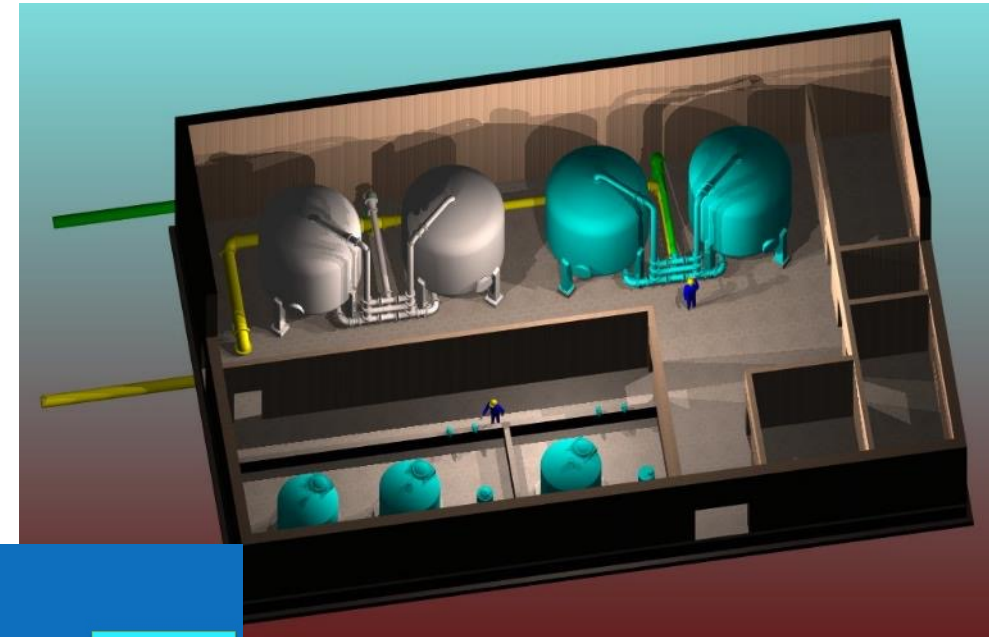
- Bench-scale column tests performed at CDM Smith's Bellevue Research & Testing Laboratory to investigate two (2) GAC products (coal-based vs. coconut-based)



- ✓ 9.8 minutes of empty bed contact time (EBCT)
- ✓ No measurable GAC breakthrough of any PFAS
- ✓ No change in anions levels
- ✓ No detection of arsenic
- ✓ No generation of long-chain PFAS from post-GAC treatment with sodium hypochlorite and phosphate
- ✓ Estimated longevity for GAC = 27,000 bed volumes

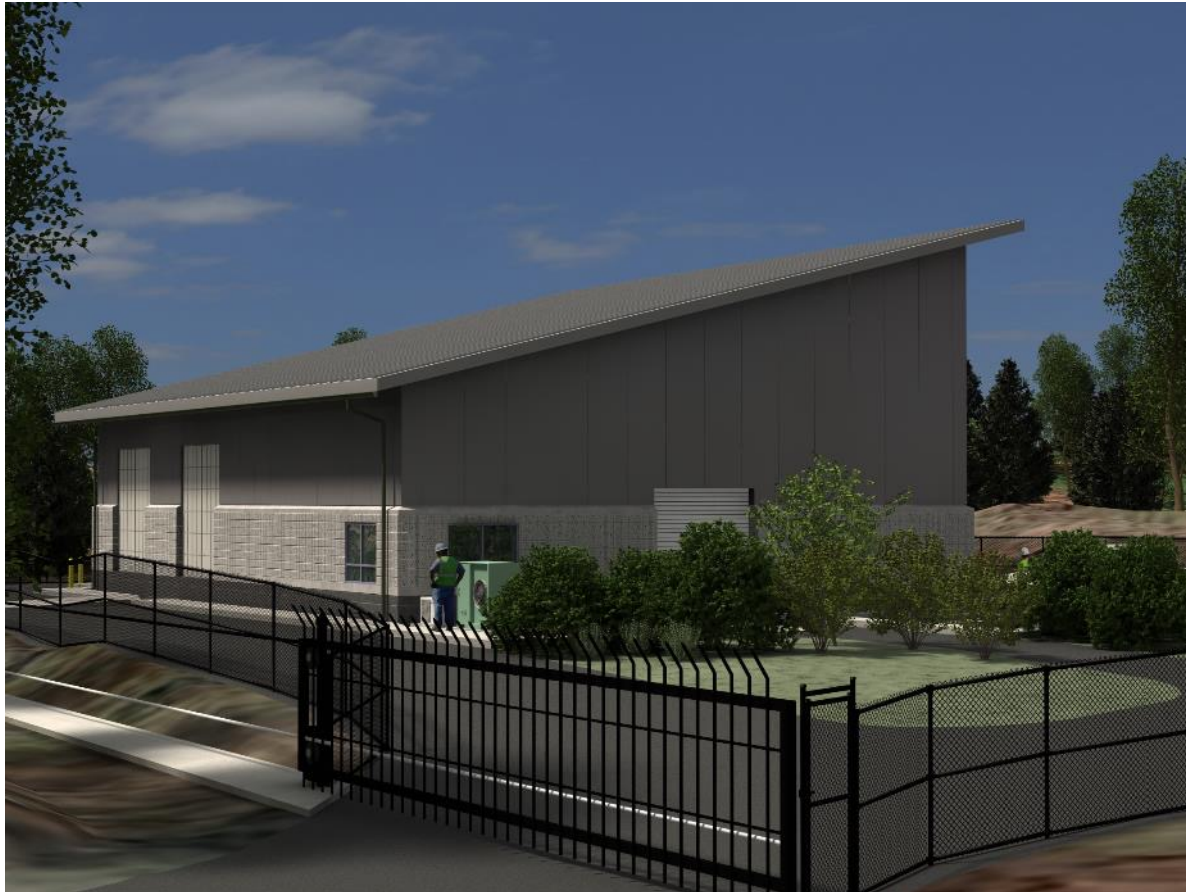
Conceptual Design

- PFAS treatment facility with a 2,700 gpm capacity (Combined capacity of Wells 7 and 8)
 - Sodium hypochlorite and phosphate chemical systems
 - Laboratory / office area
- Develop facility floor plan and site plan
- Cost estimate
- Permitting requirements



Perspective View

- Design Rendering and Spring 2019 Status



Completed Treatment Plant



Costs

- \$5.5 million construction cost.
- Biggest OPEX cost is media replacement – estimated \$120,000/year
- Additional sampling - \$300/sample, 8 samples per month, \$28,800/year
- Additional labor for to check on plant - 2 manhours/day
- Additional utility cost for gas and electricity

Current Status

- Construction started in mid-August 2018; plant placed on-line in 2020.
- Plant has been running for 16+ months; still seeing non-detect on 6 PFAS compounds
- The plant has produced nearly 400,000,000 gallons of drinking water since initial startup.
- Bench scale testing indicated ~27,000 bed volumes as the GAC longevity on this water. Plant has processed over 23,000 bed volumes to date.
- No backwashing has been needed yet, since initial plant startup. No pretreatment (Fe/Mn removal, bag filters, etc.) was needed on these groundwater sources