MINNESOTA POLLUTION CONTROL AGENCY

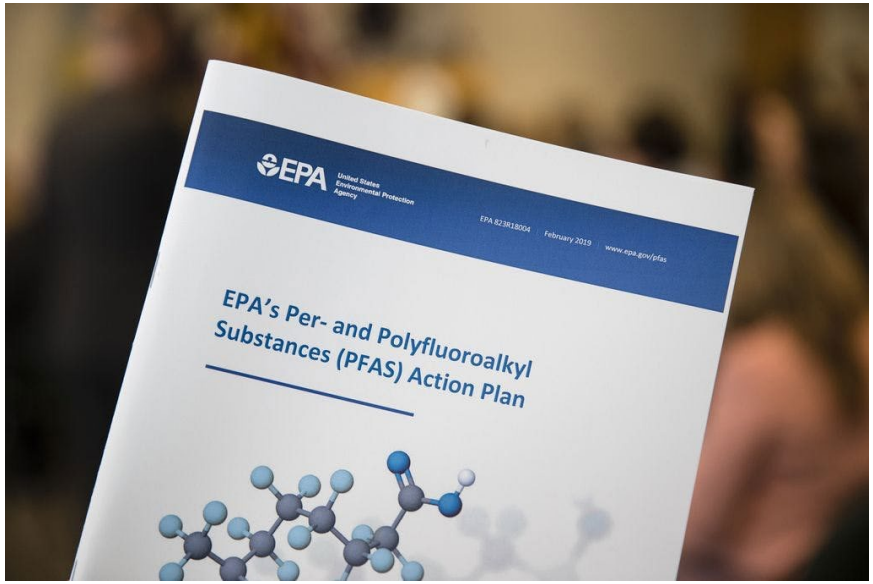
Pilot Study Update

Stantec

Cottage Grove
Where Pride and Prosperity Meet

DEPARTMENT OF HEALTH

Treatment of Regional Groundwater with Pilot Options



Activated Carbon for DW Treatment

Key Design Criteria:
EBCT, carbon material and pore size

Strengths

- High removal of longer chain compound such as PFOA/PFOS.
- Multiple suppliers.
- Well studied through plethora of bench and pilot studies.
- Applicable to intermittent (PAC) or long-term treatment (GAC) applications.

Weaknesses

- Competition from non-targeted constituents such as TOC.
- Poorer removal of small chain compounds (e.g. PFBA, Gen-X) now manufactured in place of PFOA/PFOS.
- Uncertainties of PFAS fate during regeneration.
- Incineration is energy intensive.

Anion Exchange for DW Treatment

Key Design Criteria: EBCT and resin characteristics

Strengths

- More effective at removal of short-chain PFAS compounds.
- Still effective at removal of longer-chain compounds with higher capacity than GAC.
- Minimal influence from TOC.
- Shorter EBCT results in vessels of smaller footprint than those used with GAC.

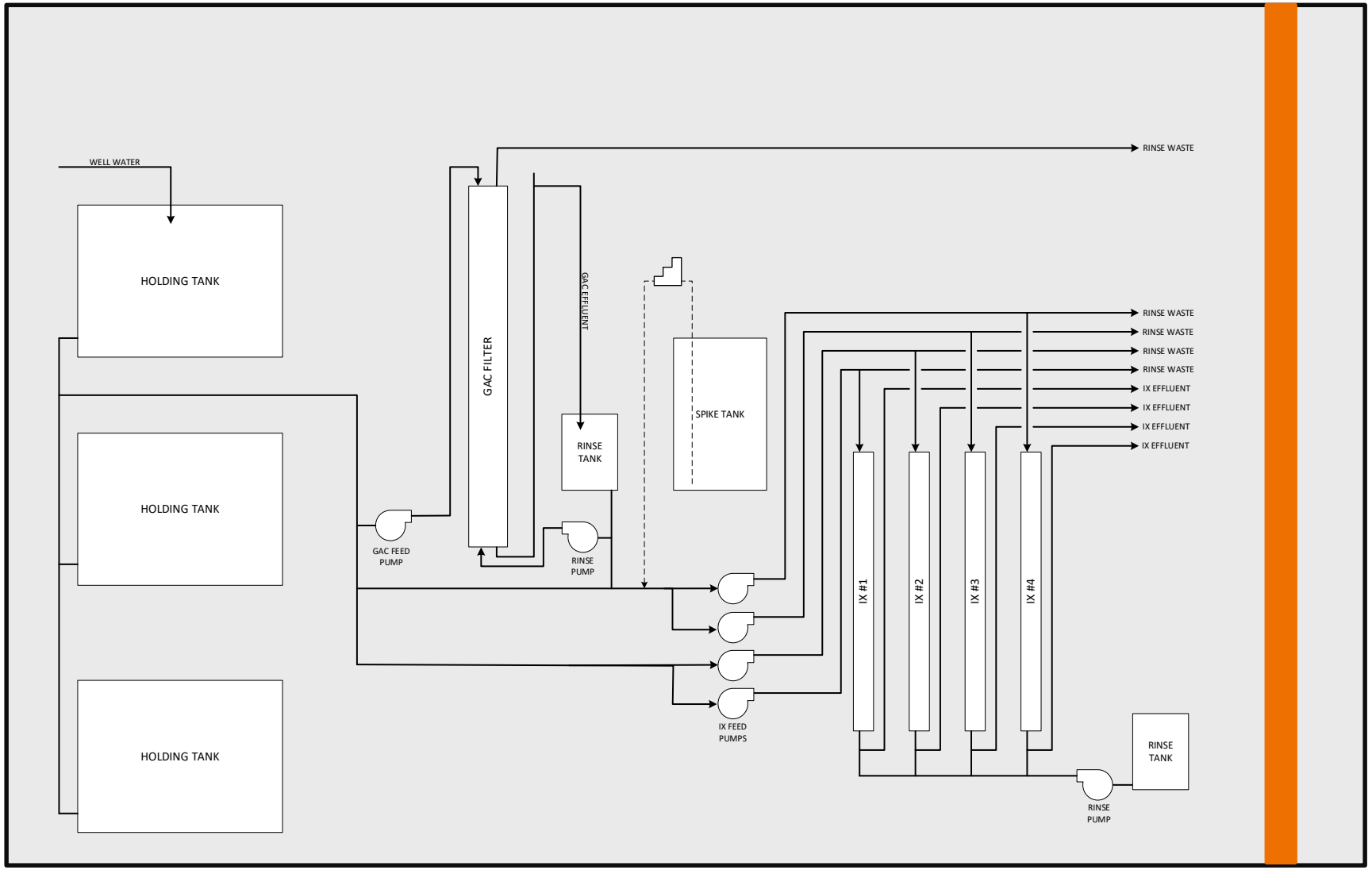
Weaknesses

- Fouling from nontargeted constituents such as iron and manganese.
- All NSF certified vendors are only for single use.
- Requirement for methanol during regeneration precludes onsite system development.
- Media more expensive than GAC, but higher bed volumes may mitigate cost differential.

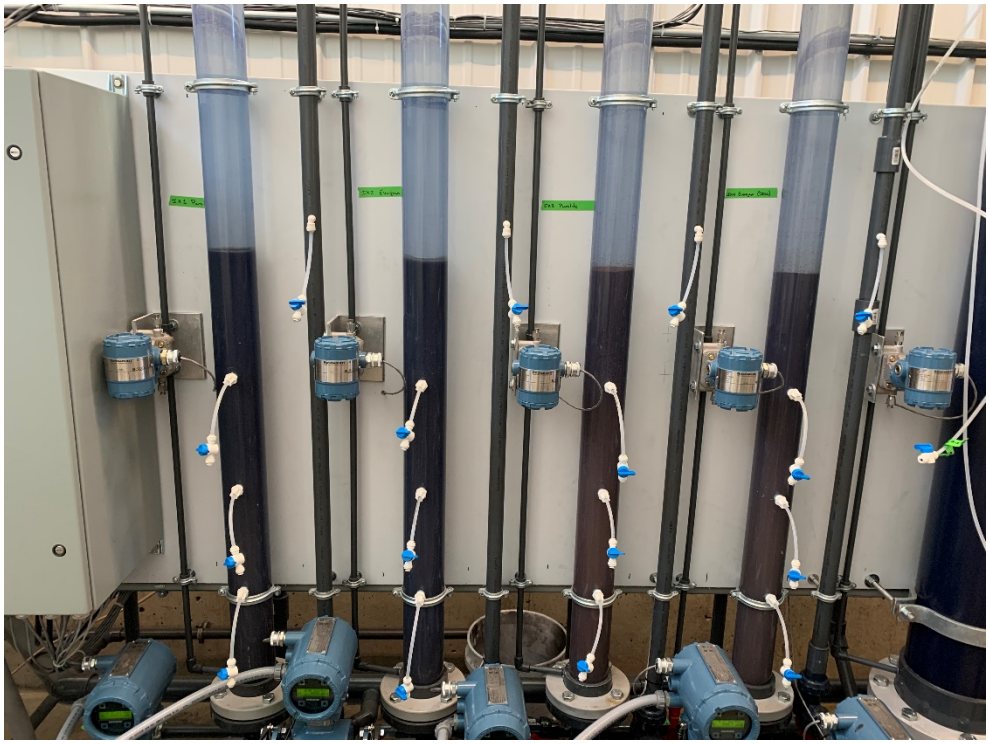
Study Goal

Evaluate ion-exchange as a potential treatment process for PFAS removal both as a stand-alone process and in conjunction with GAC.

Pilot Design



Installed Pilot Plant



Sampling Regime

Parameter	Pilot Sampling Frequency (GAC, IX, GAC/IX)				
	Influent	Effluents†	#1 Ports	#2 Ports*	#3 Ports*
Flowrate	online	na	na	na	na
Temp & Pressure	1/day	1/day	na	na	na
24 PFAS	1/week	1/week	1/month	1/quarter	1/quarter
Alkalinity, bicarbonate, chloride, iron, manganese, nitrite, nitrate, sulfate, TOC	1/every other week	1/every other week	na	na	na
pH, EC, turbidity, TDS,	1/week	1/week	na	na	na
DO	Online				

†Pilot consists of 5 effluents (i.e., GAC, IX#1, IX#2, GAC/IX#1, GAC/IX#2).
*Sampling frequencies will be increased once breakthrough is observed for Port #1

Where are we now with the pilot study?

Pilot has been constructed, mobilized and wet tested.
Initial QA/QC on pilot plant and laboratory analysis has been completed.
The Johns Hopkins/Stantec Alliance Laboratory has developed detection limits for PFAS to 0.25 ng/L.
Initial runs showed iron in the water to be an operational issue. An iron-removal (Birm) filter is currently being added to the pilot train.
Pilot to restart in approximately two weeks and operate for 18 months or until breakthrough of PFAS compounds.
After 6 months, a good idea of column behavior should be available.

Pre-Pandemic Project Schedule

Activity	Date
Mobilization of birm filter	March 16-29, 2020
Restart Pilot	March 30, 2020
Initial Results Update	June 2020
Second Results Update	September 2020
Subsequent Results Updates	Every quarter thereafter
Study Conclusion	September 2021 or HI breakthrough