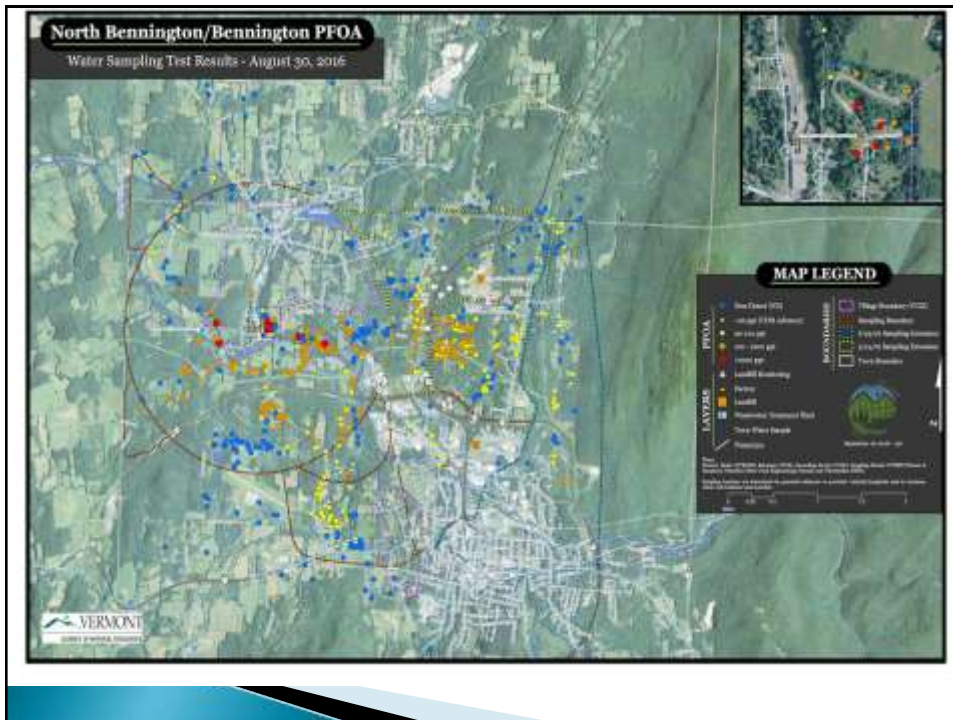


Lessons Learned on Vermont POET Installations and Operations at Residences Impacted by PFASs

NEWMOA PFAS Webinar Series
PFAS Treatment & Remediation Options Webinar
December 14, 2016

PFOA came from Textile Coating Made at Chemfab





Bennington PFOA Private Well Results

- 555 samples collected from private wells
- >60% of all wells had some level of PFOA
- 204 results : ND (37%)
- 80 results : 0–20 ppt (14%)
- 271 results : >20 ppt (49%)
- **Recent Re-sampling efforts have changed these results**

Immediate Challenge



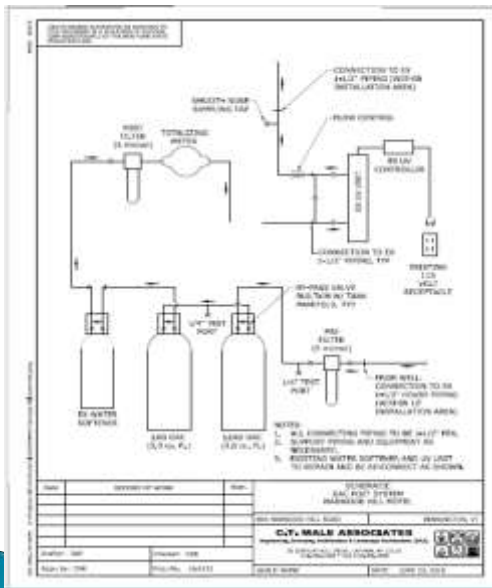
Getting Homes Clean Water

- Bottled water delivered immediately to all residents
- 11 homes/business connected to municipal system where water line nearby
- 255 Point of Entry Treatment (POET) systems installed as of 11/15/16
 - Versus Point of Use systems on a specific tap
- Connecting to municipal system long term solution: but in the interim, POETs

POET Picture



POET Schematic



- Pre-filter (Dual Gradient 50 –5 micron)
- Lead GAC Canister (2 ft3 Culligan Cullar F600AW)
- Lag GAC Canister (2 ft3 Culligan Cullar F600AW)
- Post-Filter (Dual Gradient 50 –5 micron)
- UV Lamp (VIQUA S8Q-PA)
- Flow Meter (total gallons)
- Influent, Midpoint and Effluent Water Sampling Ports

POET SAMPLING

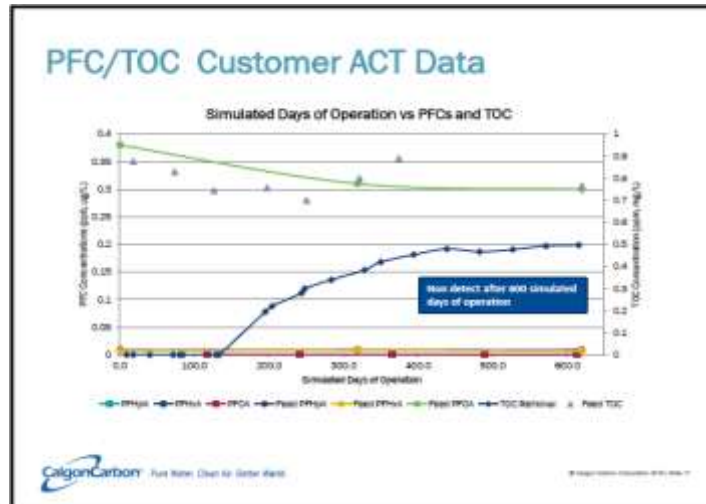
- ▶ Average time to sample after POET installed ~ 1 week (200 gallon water minimum flow)
- ▶ Sampling conducted once a month for three months.
- ▶ First round sampling: influent, effluent, and effluent arsenic sample collected.
- ▶ Second round sampling: influent and midpoint (effluent arsenic also collected if first sample result above VDHA 10 ug/l)
- ▶ Third round sampling: influent and midpoint

PFOA Results

- ▶ Influent varies for each location
($<20\text{ppt} \leq X \leq 4,600\text{ppt}$)
- ▶ Effluent- ND <20 ppt
- ▶ Midpoint- ND <20 ppt

- ▶ Volume water through each home varies:
 - 50 gallons over a month; As at 28 ug/l, 32 ug/l on resampling, to
 - $>37,000$ gallons over 3 months, As <1 ug/l, PFOA in effluent below detection limit

Carbon PFOA Removal Rates



Arsenic Results

- ▶ Arsenic sample (244 total) collected from first round sampling of POET's.
- ▶ First time sampled above VDHA 10 ug/l- 31 locations
- ▶ Second time sampled above VDHA 10 ug/l- 3 locations, due to either little or no water use or mechanical (valve) issue.

Inspection and Maintenance Schedule

- ▶ Pre and Post Filter Replacement: Every 4 months
- ▶ Ultraviolet Lamp Replacement: Every 12 months
- ▶ Ultraviolet Quartz Sleeve Cleaning: Every 4 to 12 months:

0 – 8 gpg (grams per gallon):	Every 12 months
9 – 14 gpg:	Every 6 months
15+ gpg:	Every 4 months
- ▶ GAC Canister Replacement: Every two years or upon PFOA breakthrough

Long Term Monitoring

After Initial System Sampling, Future Sampling Base on POET Influent PFOA Concentrations:*

- ▶ Influent PFOA Concentration > 1,000 ppt: Every 3 months
- ▶ Influent PFOA Concentration >200 ppt to <1000 ppt: Every 6 months
- ▶ Influent PFOA Concentration <200 ppt: Every 12 months

◦ *Frequency May Change Based on Sampling Results

GAC Changeout Process

- ▶ Remove the Lead GAC canister.
- ▶ Remove the Lag GAC canister and place it in the Lead GAC position.
- ▶ Install the replacement GAC canister in the Lag position.
- ▶ Spent GAC media will be bulked by Culligan for subsequent shipment to Calgon. GAC media will be accumulated and stored undercover at Culligan's facility until approximately 1 ton of media is accumulated. Pick-up of the bulked media will then be scheduled by Culligan with Calgon. The bulked material will be transported to Calgon's facility for processing.
- ▶ Upon return of the Lead GAC canister to Culligan, the GAC media will be evaluated and recorded for indications of biofilm accumulation, and mineral encrustation to determine if "channeling" is occurring within the GAC canister beds. Channeling can significantly reduce the GAC life cycle and will be important in determining when a GAC canister should be replaced.

Questions?

Thank you!

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