2901 E. Gate City Blvd. Suite 2200
Greensboro, NC 27401
www.remrxremediation.com

Contact us for more information
(336) 217-5171
info@remrxremediation.com

TECHNICAL FEASIBILITY OF PFAS TREATMENT TECHNOLOGIES

Overview: Per- and polyfluoroalkylsubstances (PFAS) are ubiquitous chemical contaminants that are found in groundwater, soil, humans, and the environment. PFAS are released into the environment through a variety of consumer and industrial products, including fire fighting foams, fast food packaging, waterproof textiles, pesticides, non-stick cookware, paints, and mining surfactants.

The PFAS solution will require multiple technologies in a treatment train approach. Several technologies are being explored, each at different stages of development and some currently more practical than others (Figure 1). A combination of sorptive and destructive techniques will likely be necessary to concentrate and mineralize a range of PFAS species.

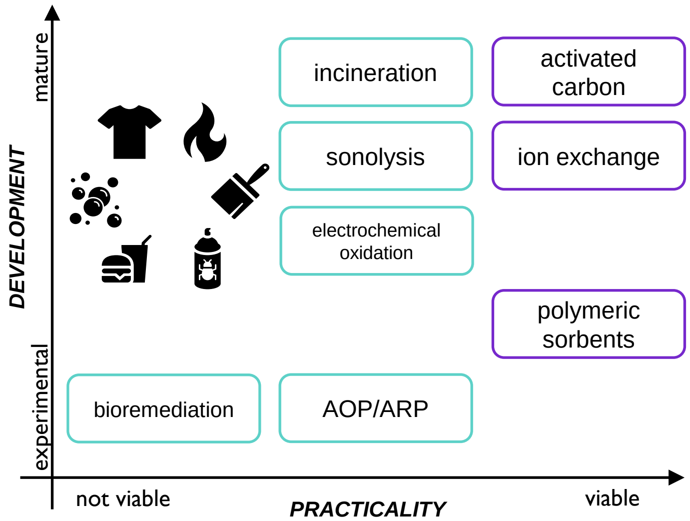

FIGURE 1. PFAS treatment technologies plotted in terms of stage of development and range of practicality. Destructive technologies are outlined in teal while sorptive technologies are outlined in purple. Adapted from Ross, I. et al. *Remediation Journal* **2018**, *28*, 101-126.

RemRx manufactures innovative solutions to solve widespread environmental issues.

RemRx™ CRP (Controlled Release Pellets) provides time-released, prescriptive oxidant dosage that sustains delivery into the subsurface after a single deployment.

RemRx™ CRI (Controlled Release Injectable) is an injectable permanganate formulation designed for treatment of low permeability zones.

RemRx™ ZVI (Zero Valent Iron) features highly reducing ZVI on a carbon support for improved transport and longevity in the subsurface.

RemRx™ is looking for R&D partners and pilot testing sites for destructive PFAS technologies. Contact us!

Recognizing that the PFAS problem will require multiple solutions, we are evaluating technologies in the following treatment train areas:

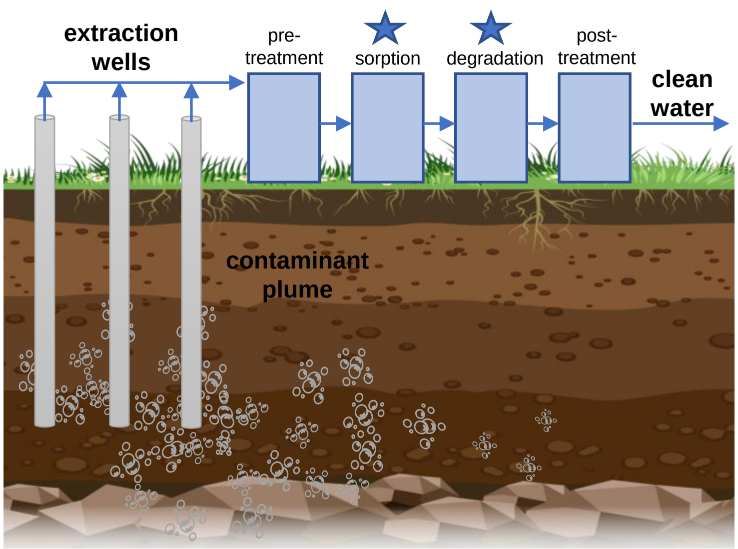

FIGURE 2. PFAS treatment train approach. PFAS is extracted from groundwater and passed through subsequent treatment stages, including pre-treatment (e.g. adjustment of hydrological conditions), concentration through selective sorption agents, degradation, and post-treatment to prepare the effluent for discharge.

Sorbents: Sorbent technologies for PFAS remediation are practical and well-developed. Activated carbon is currently the most widely used sorbent material for PFAS. While cheap, easy to implement, and moderately effective, activated carbon sorbents can suffer from poor sorption of PFAS mixtures and decreased longevity in field conditions. AxNano is evaluating polymeric sorbents that are highly selective for PFAS to address these challenges.

Advanced oxidation processes (AOP): Electrochemical oxidation and alternative oxidation processes like hydrothermal alkaline treatment, sonolysis, and plasma have been evaluated for PFAS destruction. Thermal oxidizing treatments including incineration and smoldering are also gaining traction. AxNano has evaluated one aggressive oxidation strategy for PFAS degradation. In a continuous flow reactor, complex waste streams containing PFAS showed 97% PFOS loss under unoptimized conditions.

Advanced reductive processes (ARP): Zero valent iron (ZVI) is a well-developed reductant used to remediate contaminants including chlorinated ethylenes, heavy metals, nitrates, dyes, and phenols. Recent literature reports suggest that ZVI has potential for PFAS degradation. AxNano is investigating RemRx™ ZVI as a promising technology for PFAS degradation.

 v. 200911