

PerfluorAd



PFAS Remediation in Landfill Leachate and Groundwater

PerfluorAd® Overview

PerfluorAd® is a biodegradable, plant based, oleic acid that forms an ionic bond with PFAS, generating particles or flocs, which are removed via filtration. PerfluorAd® works very well at elevated PFAS concentrations in low flow water systems, removing up to 99.9% of anionic PFAS, even in the presence of dissolved organic carbon, surfactants, and other constituents.

Landfill Leachate

Recent bench testing using two different PerfluorAd® dosing rates on landfill leachate at two sites in Germany produced the following removal rates in Table 1.

Table 1. Treating PFAS in Landfill Leachate using PerfluorAd®

Compound	Example A PerfluorAd® (40 mg/l)			Example B PerfluorAd® (100 mg/l)		
	Begin Leachate (µg/l)	End Leachate (µg/l)	Removal Rate (%)	Begin Leachate (µg/l)	End Leachate (µg/l)	Removal Rate (%)
PFOS	1.9	0.02	98.9	0.4	<0.1	100
PFHxS	1.1	0.04	96.4	0.4	<0.1	100
PFPeS	0.24	0.02	91.7	0.4	<0.1	100
PFBS	9.2	3.5	62.0	1.3	0.3	76.9
PFOA	0.68	0.08	88.2	2.0	0.2	90.0
PFHxA	0.63	0.46	27.0	5.2	2.4	53.8
*DOC	21	24	0	110	110	0

*DOC – dissolved organic carbon content in leachate (mg/l)

The average removal rates of the six PFAS compounds at the PerfluorAd® dosage rates of 40 mg/l and 100 mg/l were 77.4% and 86.8%, respectively. PFOS, PFHxS, PFPeS, and PFOA showed higher average removal rates of 99.5%, 98.2%, 95.95 and 89%, respectively. The high DOC concentrations in the leachate had no adverse effect on the PerfluorAd® treatment.

PFAS Remediation of Groundwater

Groundwater

The table below presents collated data from six projects in Germany. Flowrates from the groundwater pump and treat systems ranged from a low of 15,840 gpm in Sinzheim, Germany, to as high as 237,600 gpm in Dusseldorf, Germany. Each site had a 100% removal efficiency of PFAS from groundwater following a GAC polish.

Table 2. Treatment of PFAS in Groundwater using PerfluorAd®

Parameters	Location in Germany					
	Nuremberg Airport	Sigmaringen	Sinzheim	Münster	Cologne	Dusseldorf
Flowrate (gpm)	31,680	47,520	15,840	63,360	47,520	237,600
*Total PFAS Influent (µg/l)	700	10	2	80	2	30
*Total PFAS Effluent (µg/l)	0	0	0	0	0	0
PerfluorAd® dosage (mg/l)	40	25	10	60	10	20
Residue generated (lbs/day)	5.28	4	0.55	10.56	3.96	19.8
Polish media	GAC	GAC	GAC	GAC	GAC	GAC
Year completed	Ongoing	2016	2016	Ongoing	2018	2016
Operating days	2,000	250	200	1,500	500	350

**Total PFAS is represented by 19 compounds.*

Other Applications

- ◆ Recovered fire-fighting fluids
- ◆ AFFF rinse and treatment of:
 - Fire trucks and airfield tenders
 - Fixed extinguishing system
- ◆ Industrial process water

Key Advantages

- ◆ Not an adsorption process
- ◆ Removes bulk of the PFAS
- ◆ Infinitely adjustable
- ◆ Unaffected by pH, DOC, suspended solids, co-contaminants
- ◆ Cost savings vs. activated carbon or ion exchange processes

