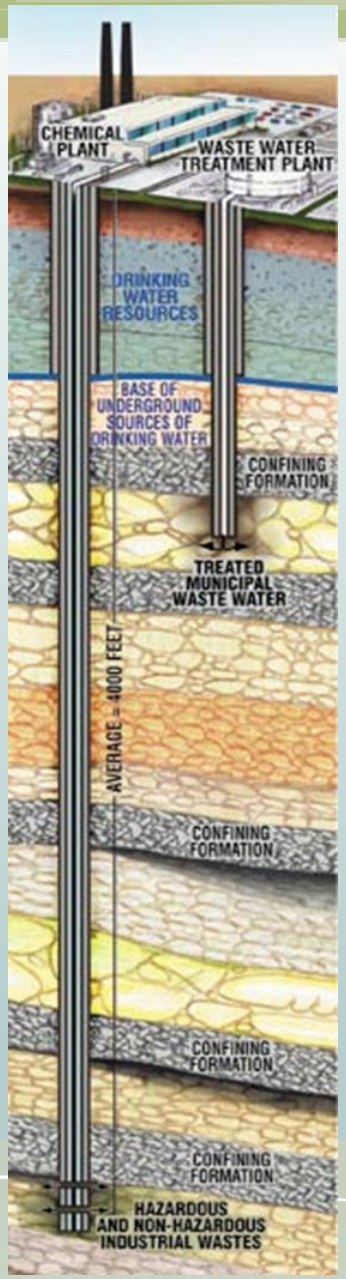

PFAS Regulation

WHAT DOES THE FUTURE HOLD FOR CLASS I WELLS?

Monte Markley, P.G.
February 17, 2020

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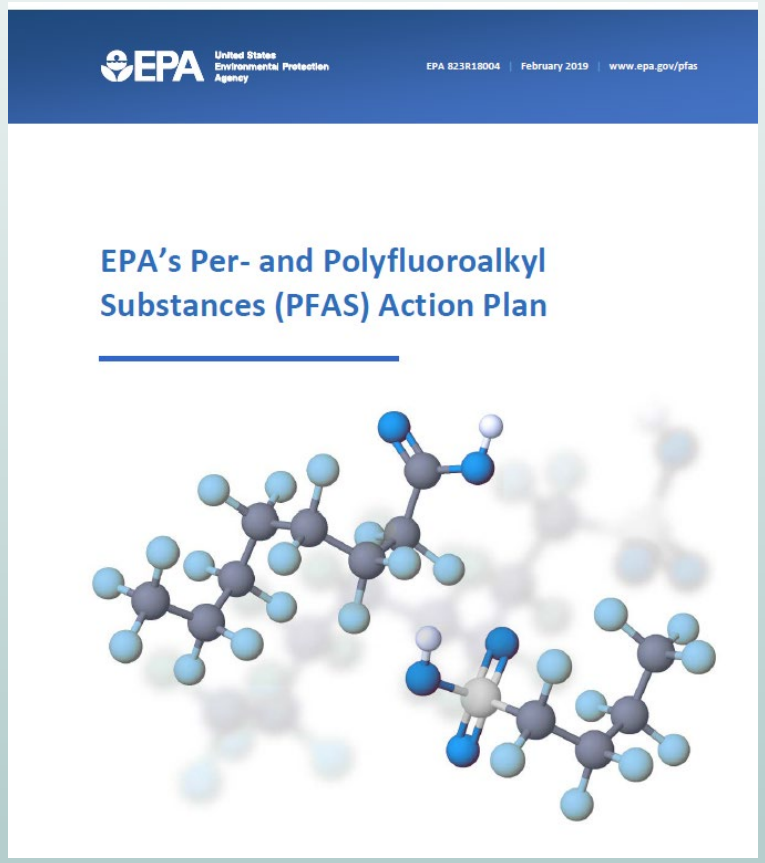
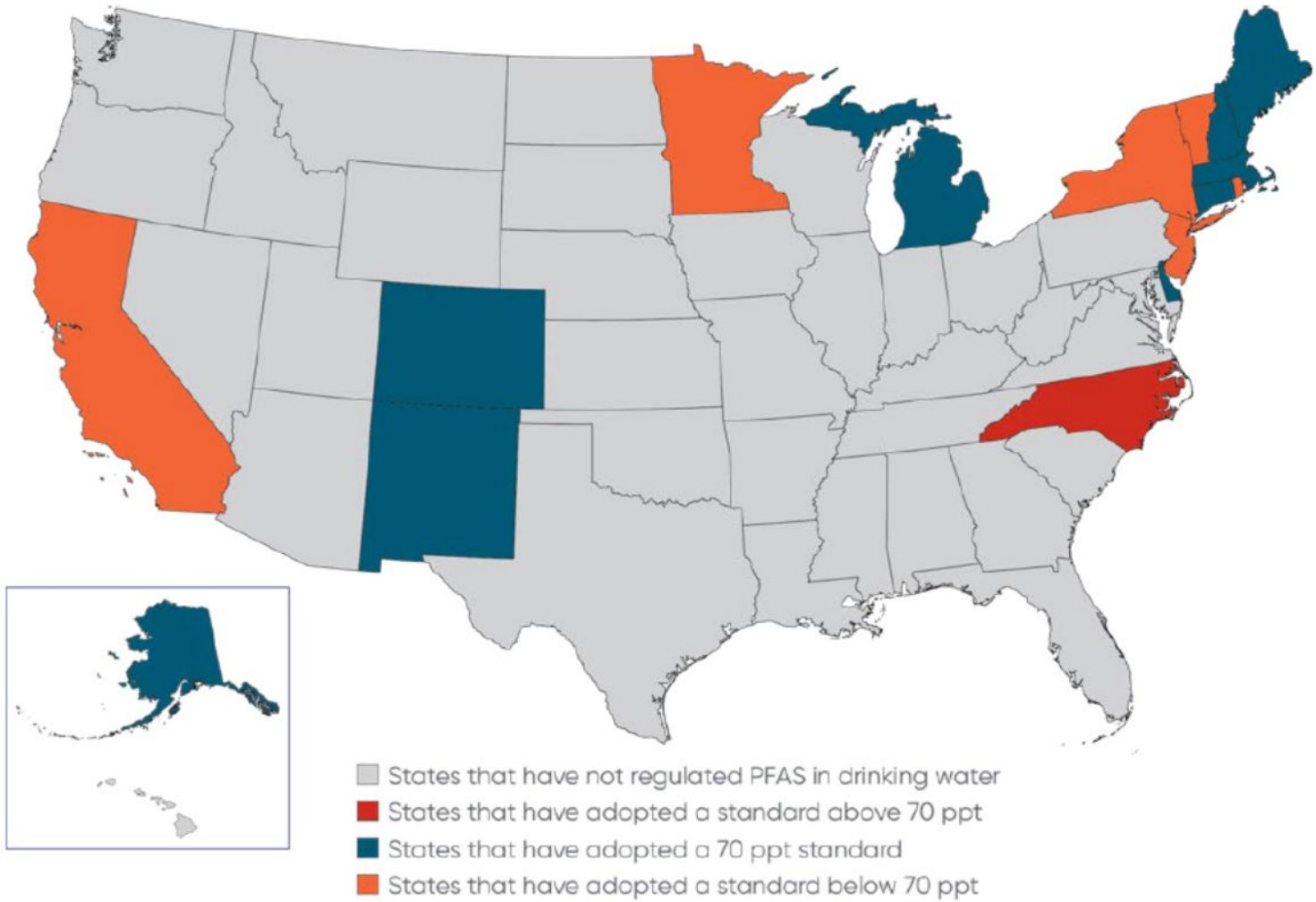
PFAS ACTION PLAN- EPA FEB. 2019



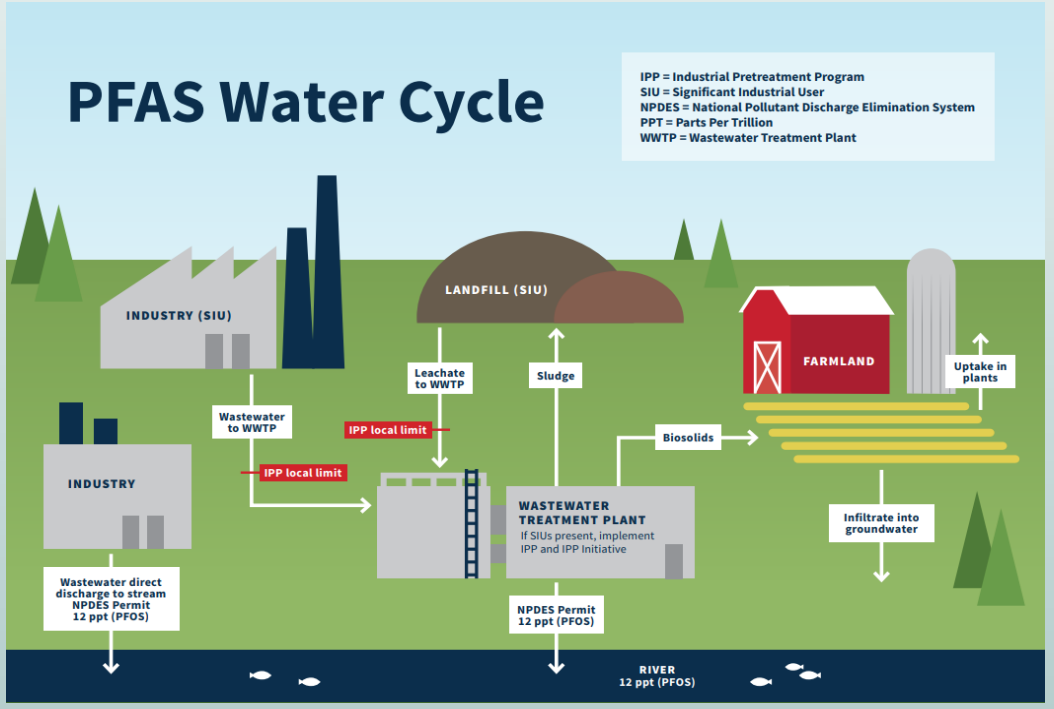
- List PFOA & PFOS as CERCLA hazardous substance
- Keep PFAS out of surface & groundwater
- Develop interim cleanup levels
- **ID new/additional treatment & remediation options**

PATCHWORK OF STATE ACTIONS



https://www.jdsupra.com/legalnews/state-by-state-regulation-of-per-and-82542/

Near Term Priorities for EPA

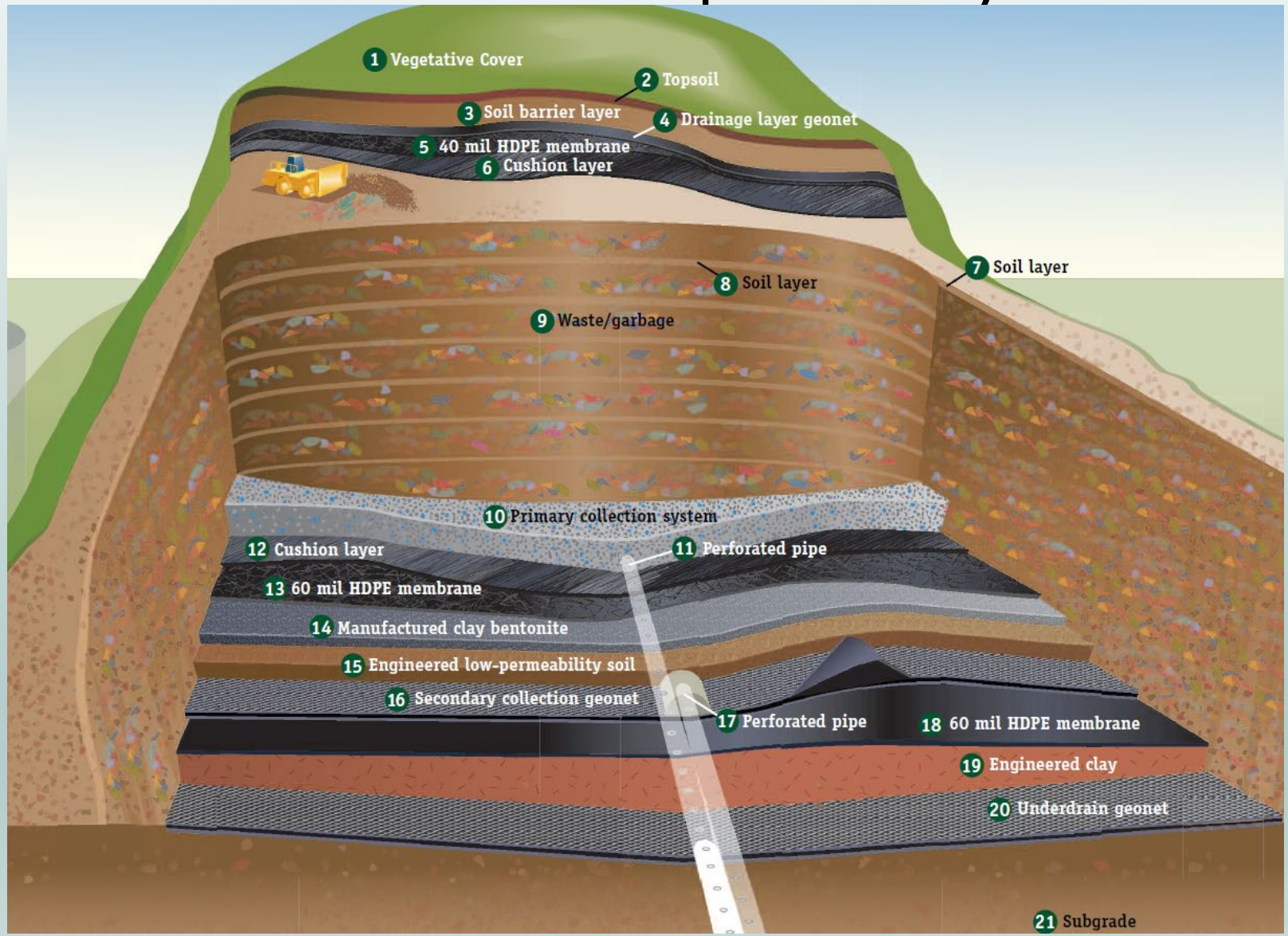


- Sources & levels of PFAS in environment
- Human health risks
- Develop final cleanup levels
- **Understand applicable treatment & disposal options**

PFAS Treatment Options

Treatment Method	PFOA	PFOS	Considerations
Granular Activated Carbon	48-90%	89-98%	GAC requires replacement and disposal
Ion Exchange	51-90%	90-99%	Resins need to be regenerated or replaced
Membrane Filtration	10-50%	0-23%	Waste stream contains salts and filtrate that requires disposal
Reverse Osmosis	90%	93-99%	Waste stream contains salts and retentate that requires disposal

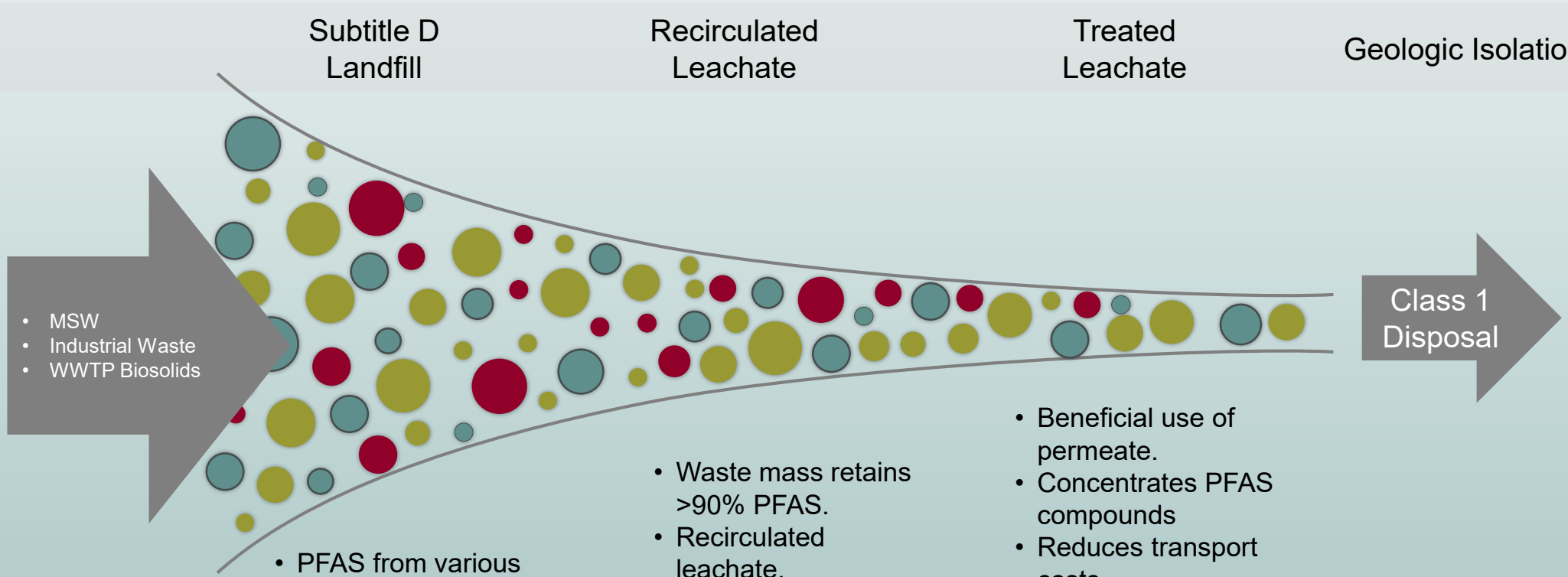
Landfills as PFAS Repository



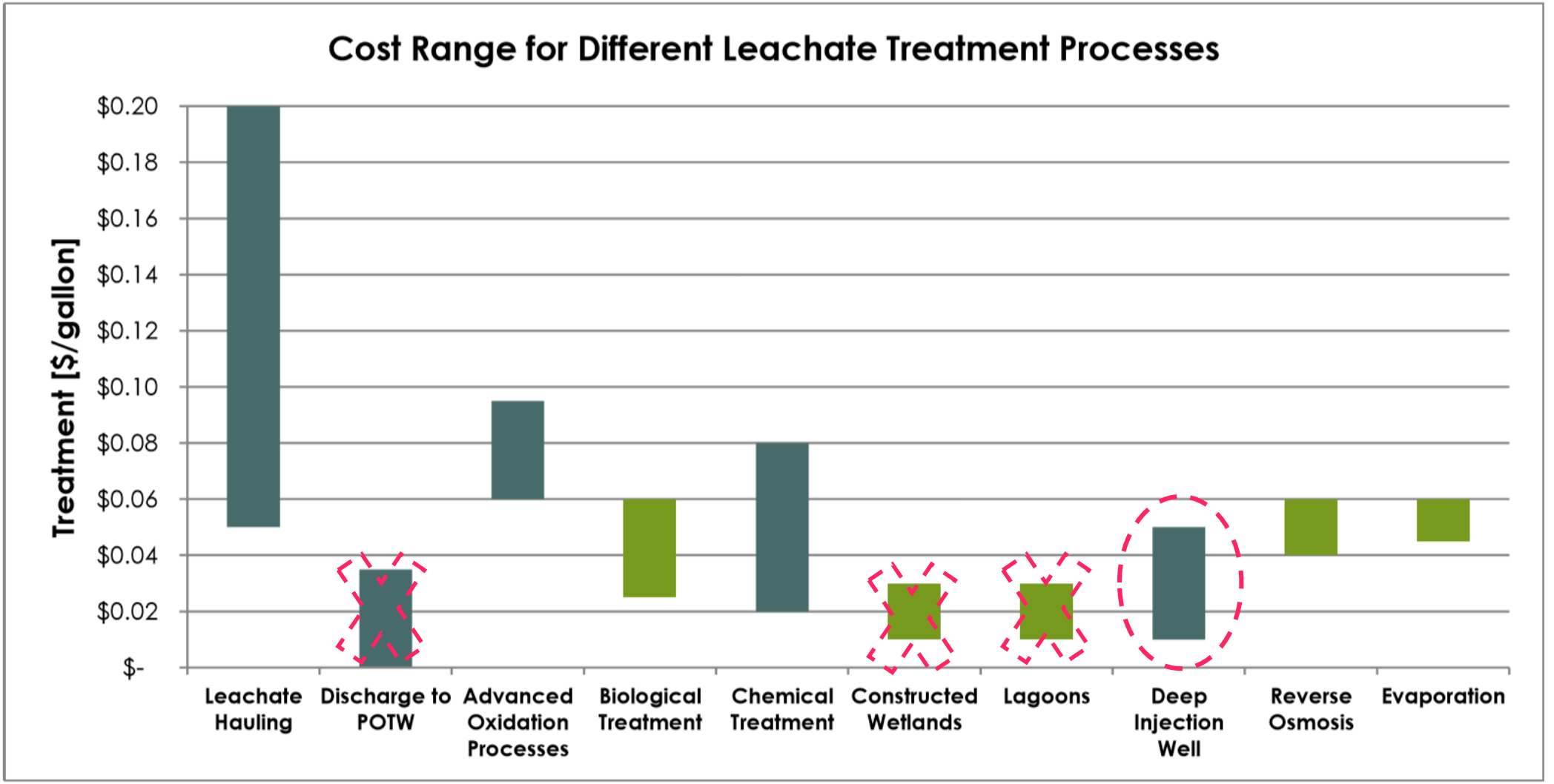
PFAS Treatment Using Reverse Osmosis

Compound (ng/l)	Leachate (ng/L)	RO 1 Permeate (ng/L)	RO 2 Permeate (ng/L)	Rejection
Perfluorobutanesulfonic acid (PFBS)	280	<2	<1.9	>99.3%
Perfluorobutanoic acid (PFBA)	1100	5	<1.9	>99.8%
Perfluoroheptanoic acid (PFHpA)	480	<2	<1.9	>99.6%
Perfluorohexanesulfonic acid (PFHxS)	690	<2	<1.9	>99.7%
Perfluorohexanoic acid (PFHxA)	2100	7.8	<1.9	>99.9%
Perfluorooctanesulfonic acid (PFOS)	200	<2	<1.9	>99.1%
Perfluorooctanoic acid (PFOA)	820	2.5	<1.9	>99.8%
Perfluoropentanoic acid (PFPeA)	880	2.7	<1.9	>99.8%
Total	6550	18	0	>99.9%

PFAS Waste Reduction Strategy



Relative Treatment Costs



Reference: Solid Waste Association of North America, Advanced Leachate Management Course Guide Figure 8-1: Cost Ranges for Leachate Treatment Processes ©2014. Bluegreen entries –modified by Sam Cooke in 2018.

Discussion

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