

Table A-7.B. Evaluation factors for surfactant-enhanced subsurface remediation

Remedial time frame	Concern	Very low to low
	Discussion	Very short to short. Bench-testing can be used to determine the number of pore volumes needed to remove the LNAPL. Typically, with finer-grained material, additional pore volumes are needed. Generally faster than DPLE and AS/SVE.
Safety	Concern	Low to moderate
	Discussion	Surfactants are not dangerous, but there may be safety issues due to the equipment used to inject the surfactant and treat the extracted mixture. LNAPL may be extracted and handled. Make sure you have good capture of the LNAPL.
Waste management	Concern	Moderate
	Discussion	The recovered surfactant and LNAPL need to be disposed of as nonhazardous waste. Depending on what is recovered, may be able to dispose into sanitary sewer or transport to a disposal facility. Surfactants cause the aqueous waste stream to contain very high dissolved concentrations of LNAPL constituents and can pose challenges for aqueous-phase treatment systems.
Community concerns	Concern	Low to moderate
	Discussion	Concern with use of chemical treatment, volatile emissions, odors, noise. Trucks and equipment may be on site for some time.
Carbon footprint/ energy requirement	Concern	Low to moderate
	Discussion	Depends on whether the surfactant is gravity fed or injected. Mixing as well as extraction and treatment of waste require energy source.
Site restrictions	Concern	Moderate
	Discussion	No major construction activity or subsurface disruption but may need to restrict application area access while injecting and recovering fluids. Field team on site during application of technology.
LNAPL body size	Concern	Moderate to high
	Discussion	The success rate is higher for very small areas. As the treatment area increases in size, the chance for success decreases. May consider the technology as a follow-up to a traditional technology such as MPE to remediate areas missed. A large area can be broken up into several smaller areas for treatment.
Other regulations	Concern	Moderate
	Discussion	May need permits to inject and discharge.
Cost	Concern	Moderate to high
	Discussion	See discussion for the cosolvent sheet
Other	Concern	Surfactant formulation
	Discussion	Discuss application with vendors. Aquifer and LNAPL chemistry are critical factors to success.