

Table A-21.A. In situ soil mixing and stabilization

Technology	In situ soil mixing (stabilization)	Uses mechanical mixing of soil or aquifer materials with low-permeability materials such as clay and/or reactive media such as chemical oxidants or electron acceptors and/or stabilizing media such as Portland cement.	
Remediation process	Physical mass recovery	No	Manages mass in place by creating a homogenous zone of soil with a lower mass flux in the dissolved phase.
	Phase change	No	Soil mixing itself does not induce a phase change, but LNAPL is redistributed throughout the mixed interval; some incidental volatilization may occur.
	In situ destruction	Maybe	If reactive media added, some LNAPL constituents can be destroyed.
	Stabilization/ binding	Yes	Stabilization of LNAPLs in place is the primary mechanism of this technology.
Objective applicability	LNAPL saturation	Yes	Homogenizing LNAPL zone reducing LNAPL saturation level to immobile (residual) saturations.
		Example performance metrics	Reduced LNAPL mobility, direct analysis of soil to measure changes in LNAPL saturation profile, maximum soil concentration reduced to cleanup criteria, reduced or stable dissolved-mass flux downgradient.
	LNAPL composition	Maybe	If no reactive media added, no change in chemical composition expected; if reactive media added, destruction of some LNAPL constituents.
		Example performance metrics	Change in LNAPL constituent ratios or mass.
Applicable LNAPL type	All LNAPL types		
Geologic factors	Unsaturated zone	Permeability	Not typically a factor.
		Grain size	Not typically a factor.
		Heterogeneity	Most advantageous in heterogeneous settings where complex LNAPL saturation profiles due to geologic heterogeneities are homogenized due to soil mixing.
		Consolidation	Works well in all unconsolidated geologic settings.
	Saturated zone	Permeability	Not typically a factor.
		Grain size	Grain sizes including cobbles may be difficult to treat with soil mixing.
		Heterogeneity	Most advantageous in heterogeneous settings where complex LNAPL saturation profiles due to geologic heterogeneities are homogenized due to soil mixing.
		Consolidation	Works well in all unconsolidated geologic settings.