



Soil Remediation For UST Sites

In Situ Passive Biodegradation (Natural Attenuation)

In situ passive biodegradation (natural attenuation) is an approach for removing biodegradable contaminants from soil. This method of remediation relies on microorganisms to break down petroleum products in the soil. It does not require the addition of oxygen or nutrients to facilitate the process.

In situ passive biodegradation is extremely slow. It is most appropriate when expedient remediation is not needed and nearby receptors will not be affected by contaminated soil. To date, few sites have been fully remediated using this approach.

This technique offers low cost and minimal disruption to business operations. In addition, this method generates no wastestreams.

Petroleum Types And Constituents

- Fresh or weathered gasoline, diesel, jet fuel, kerosene
- Volatile organic compounds (VOCs) such as benzene, toluene, ethylbenzene, and xylene (BTEX); residual semivolatile organic compounds (SVOCs) such as polynuclear aromatic hydrocarbons; and nonvolatile constituents

In Situ Passive Biodegradation (Natural Attenuation)

Advantages	<ul style="list-style-type: none"> • Costs substantially less than other methods • Eventually degrades volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and nonvolatile organic compounds • Causes minimal disruption to business operations • Generates no wastestreams • Reduces potential for human contact with contaminated soil or soil vapor
Limitations	<ul style="list-style-type: none"> • Targets only biodegradable constituents • Is an extremely slow process • Requires sufficient nutrients, moisture, active indigenous microbial population, and pH of 6-9 to degrade contaminants • To date, few sites have been fully remediated
System Components	<ul style="list-style-type: none"> • Monitoring wells • Soil borings • Soil vapor probes
Wastestream Treatment	<ul style="list-style-type: none"> • None
Parameters to Monitor¹	<ul style="list-style-type: none"> • Soil and groundwater contaminant concentrations • Oxygen and carbon dioxide
Cleanup Levels and Timing²	<ul style="list-style-type: none"> • Can achieve risk-based cleanup levels • Computer models project average remediation times of 50 to 200 years • Longer time required to degrade heavier hydrocarbons
Costs³	<ul style="list-style-type: none"> • Costs vary depending on monitoring frequency and risk assessments • Average risk assessment costs: \$10,000 to \$50,000 • Average monitoring and reporting costs: \$10,000 to \$60,000

¹Parameters to monitor are for performance purposes only; compliance monitoring parameters vary by state.

²Cleanup standards are determined by the state.

³Costs include equipment, and operation and maintenance.