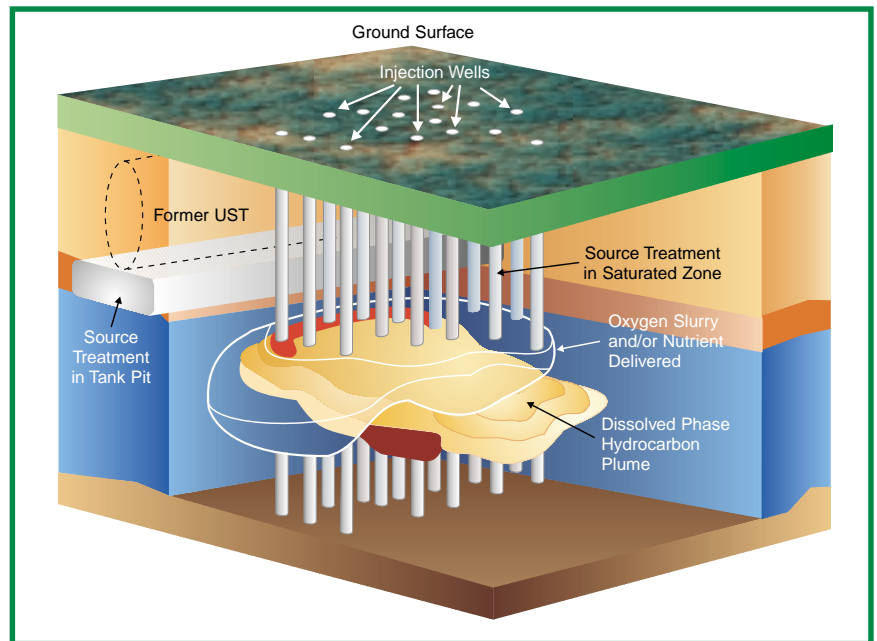
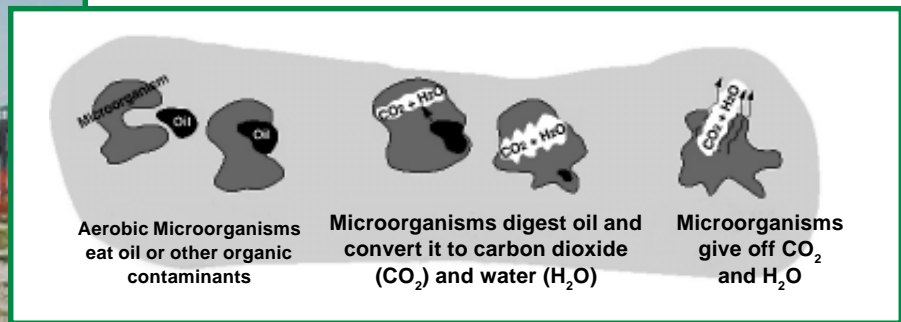


Active Remediation

Bioremediation



Bioremediation

Aerobic biodegradation is the natural process of the metabolic breakdown of contaminants by microorganisms into less harmful components. Under optimum physical, chemical, and biological conditions, the natural population of subsurface microorganisms multiplies rapidly and uses petroleum contamination as a food source, leaving the harmless by-products of additional microbial growth, carbon dioxide, and water. However, success often is limited by the lack of sufficient oxygen for microorganisms in the contaminated zones. Bio-remediation is a process that attempts to create such optimum conditions by introducing essential nutrients and air or another oxygen source to the contaminated area in order to enhance the natural population of microorganisms.

During hydrogen peroxide enhancement, a dilute solution of hydrogen peroxide is circulated through the contaminated groundwater zone to increase the oxygen

content of groundwater and enhance the rate of aerobic biodegradation of organic contaminants by naturally occurring microbes. Air sparging below the water table also increases groundwater oxygen concentration and enhances the rate of biological degradation of organic contaminants by naturally occurring microbes (see page 17 for an explanation of air sparging). Bioremediation may also be accomplished by introducing bacteria which have been specialized to thrive on particular contaminants. Although more expensive, it is possible to create external (above-ground) treatment processes for soil or groundwater that provide a more controlled environment and more predictable results.

Typical equipment varies. Most subsurface applications involve introduction points for the oxygen source and nutrients and some form of slurry or solution delivery apparatus involving mixers and pumps.