Ground Water, Surface Water, and Leachate

Hydrofracturing

Introduction:

Hydrofracturimg involves the injection of pressurised water through wells cracks and low permeability over-consolidated sediments. The cracks are packed with porous media that act as substrates for bioremediation or to help improve the pump rate efficiency.

Description:

Fissures produced in the process are filled with a porous medium that can assist bioremediation and/or improve extraction efficiency. Fractures encourage uniform delivery of treatment fluids and greater extraction of mobilised contaminants. Standard applications are linked with soil vapour extraction, in situ bioremediation, and pump-and-treat systems.

The fracturing process starts with the injection of water into a sealed borehole until the pressure of the water surpasses that of the overburden pressure and a fracture is created. A slurry of coarse-grained sand and gum gel (or a similar substitute) is injected as the fracture grows away from the well. Following pumping, the sand grains hold the fracture open whilst an enzyme additive breaks down the viscous fluid. The thinned fluid is then pumped from the fracture, developing a permeable subsurface channel appropriate for delivery or recovery of a vapour or liquid.

The hydraulic fracturing process may be used in combination with soil vapour extraction technology to improve recovery. Hydraulically induced fractures are used to transport fluids, substrates and nutrients for *in situ* bioremediation applications.

Applicability:

Hydrofracturing is valid for a range of contaminant groups with no specific target group.

Limitations:

- Technology must not be used in bedrock vulnerable to seismic activity.
- Investigation of possible underground utilities, structures, or trapped free product is necessary.
- Potential exists to open new pathways leading to the unwanted spread of contaminants (e.g., DNAPLs).
- Pockets of low permeability may remain after using technology.
- There is an inability to control the final location or size of the fractures that are produced.
- Fractures are likely to collapse due to over burden pressure.

Performance Data:

The technology has had extensive use in the petroleum and water-well construction industries but is an inventive method for remediating hazardous waste sites.

Cost:

The cost per fracture is approximately £ 600 to £ 1,200, based on generating four to six fractures a day. The cost, which includes equipment rental, operation, and monitoring, is small compared to the benefits of enhanced remediation and the reduced number of wells necessary to complete the remediation. Several factors impact the costs of creating hydraulic fractures on a site, such as site accessibility and degree of soil consolidation; the degree of soil saturation and geographical location. These all affect the accessibility of services and supplies.