



MULTI PHASE EXTRACTION

Multi-phase extraction (MPE) is a generic term used to describe in-situ groundwater remediation techniques that use a vacuum system to remove various combinations of contaminated groundwater, free product and soil vapour from the sub-surface. Contaminated groundwater recovery is achieved by pumping from beneath or at the water table, while the applied vacuum recovers soil vapours. The combination of pumping and a vacuum enhances drawdown of the water table at the abstraction well, increasing groundwater recovery and exposing larger areas of sorbed contamination for treatment.

The recovered groundwater, free product and soil vapours are passed through various treatment systems (e.g. knockout pot, oil-water separator, sand filter, carbon bed adsorbers, bioreactors) that separate the free product from the groundwater or treat the contaminants, allowing the safe discharge of the treated water and gas phases.

MPE can be applied in a number of configurations, the most popular being single and two pump configurations and bioslurping.

Single pump configuration

In this configuration a single drop tube is used to collect free product, contaminated groundwater and soil vapour. The vacuum and liquid suction lift is achieved by one pump. This configuration is used to treat shallow groundwater, typically up to 10 metres depth.

Two pump configuration

In this configuration, which can be applied for the treatment of deeper groundwater, a submersible pump is used to recover groundwater or free product in conjunction with a separate vacuum pump. The liquid and vapour streams are recovered separately.

Bioslurping

In this configuration the drop tube is set at or just below the liquid-air interface and groundwater, free product and soil vapour are extracted from a single tube. The extraction point alternates between collection of soil vapours and liquid. A secondary goal of bioslurping is the enhancement of in-situ aerobic biodegradation of the contaminants as a result of increased air flow through the soil matrix.

Advantages of multi-phase extraction: -

- Increase in groundwater recovery rates relative to conventional pumping practices;
- Increase in radius of influence of individual groundwater abstraction wells;
- Recovery of floating free-product (e.g. petroleum products);
- Remediation of capillary fringe and smear zone;
- Simultaneous remediation of contaminated groundwater and soil; and
- Remediation of volatile, residual phase contaminants located above the below the water table.

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