

IEG Technical Briefing Note No. 6

In situ Well Stripping / Vacuum Vaporiser Well - IEG IWS - UVB

Possible Areas of Application

The IEG UVB is an in-situ system for the remediation of contaminated aquifers, especially those contaminated with volatile and semi-volatile hydrocarbons, using a combination of chemical, physical and biological processes.

Description of Method

Primary Components: an IEG UVB process unit consists of a specially-adapted groundwater well, a negative pressure stripping reactor, an above-ground blower, and a waste air decontamination system (for example disposable filters or regenerative activated carbon filters).

Principle of Operation: groundwater level rises inside the well due to the application of a low negative pressure generated by a blower, typically 40-80 millibars. Ambient air is pulled through the multi-stage stripper (labyrinth stripper) via a pipe connected to the stripping reactor located in the well. The rising air bubbles enhance the suction effect at the well bottom and this effect is further enhanced by the use of an air-lift-pump.

Dry Air: as a result of the concentration gradient which develops, the contaminants vaporise into the air bubbles and are removed from the well by the air flow. The continuous expansion of the air bubbles when passing through the stripping zone causes adiabatic cooling, which results in a decrease of the relative humidity of the extracted air.

Efficient Use of Activated Carbon Filter: when the contaminated exhaust air passes through the activated carbon filter, no water condensation occurs due to the low humidity of the air. Therefore, a significantly greater part of the activated carbon filter can be utilised (typically 30-40%) for adsorption of pollutants as compared to conventional air stripping (typically only 5%).

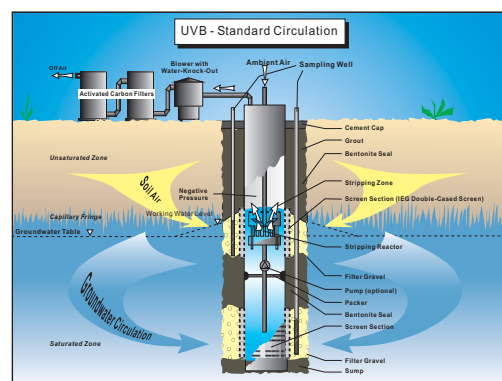
Air-Lift-Effect: the rising of the air bubbles supplements the lifting effect of the negative pressure and further elevates the groundwater within the well. The subsequent fall of the groundwater along the walls of the well produces a significant hydraulic pressure. Pipes positioned within the well transport additional contaminated water from deeper well sections to the active remediation zone.

Transport within the Well: by adding a support pump to the IEG UVB system, a specific flow direction can be induced, which produces a vertical flow either upward or downward within the well. The oscillating hydraulic pressure forces the water horizontally into the aquifer along the top screened segment of the well. In the surrounding aquifer a circulation flow cells develops with water entering at the base of the well and leaving through the upper screened segment or vice versa, depending on the desired flow direction.

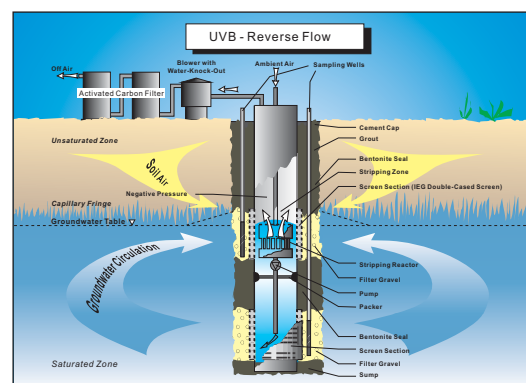
Sphere of Influence: a flow pattern with a calculable horizontal and vertical component is produced in the aquifer to compensate for the directed water flow within the UVB well.

Non linear frequencies produced by the bursting air bubbles inside the well are transmitted as pressure waves to the surrounding subsoil. They enhance diffusion of contaminants into the groundwater, which are subsequently incorporated into the UVB circulation and then treated in the well. Thus, treated groundwater circulates through the sphere of influence (within the aquifer) before returning to the well.

Simultaneous Soil Air Venting: the IEG UVB method is capable of extracting soil air during ground water treatment. The amount of soil air and groundwater passing through the decontamination system can be adjusted according to the type of contamination and the well construction.



IEG Vacuum Vaporiser Well System
for physical removal of volatile contaminants
(IEG IWS UVB-Standard Process)



IEG Vacuum Vaporiser Well System
for physical removal of volatile contaminants
(IEG UVB-Reverse Process)



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