

Ground Water, Surface Water, and Leachate

Biofiltration

Introduction:

Vapour-phase organic contaminants are pumped through a soil bed and sorb to the soil surface where they are biodegraded by microorganisms.

Description:

Biofiltration is a low-cost and extremely effective air pollution control (APC) technology in which vapour-phase organic contaminants are passed through a porous media and sorb to the media surface where they are degraded by microorganisms. Definite strains of bacteria can be introduced into the filter and optimal conditions provided to preferentially degrade specific compounds. The biofilter provides numerous advantages over traditional activated carbon adsorbers. Firstly, bio-regeneration keeps the maximum adsorption capacity available constantly, therefore, the mass transfer zone remains stationary and relatively short. The filter does not require regeneration, and the required bed length is significantly reduced. These characteristics reduce capital and operating expenses. Moreover, the contaminants are destroyed not just separated as is the case with granulated activated carbon (GAC) technologies.

Applicability:

Biofiltration is greatly dependent upon the biodegradability of the contaminants. Under optimum conditions, biofilters can remove virtually all contaminants to harmless products. Biofiltration is used principally to treat non-halogenated VOCs and fuel hydrocarbons. However, halogenated VOCs can also be treated, but the process may be less efficient. Biofilters have been successfully used to control the odours from compost piles.

Limitations:

- Rate of influent airflow is constrained by the size of the biofilter.
- Fungi may be a problem.
- Low temperatures can slow or stop the treatment process, unless the biofilters environment is maintained at optimum conditions.
- Contaminants recalcitrant to biodegradation will not be degraded.

Performance Data:

Non-proprietary filters that require low air loading rates for organics (100 ppm) have been used effectively for many years. Proprietary designs that carry higher air loadings also are available. Biofilters have been used widely in Europe and Japan, but only recently have they received attention in the US.

Moisture levels, pH, and temperature have to be monitored to maintain high removal efficiencies. Filter flooding and plugging as a result of excessive biomass accumulation may well require periodic mechanical cleaning of the filter.

Cost:

Cost estimates range from £ 4 to £ 15 per kilogram of contaminant.