Ground Water, Surface Water, and Leachate

Thermal Treatment

Introduction:

Steam is directed into an aquifer by means of injection wells to vaporise volatile and semi volatile contaminants. Vaporised components rise to the unsaturated zone where they are isolated by vacuum extraction and then treated.

Description:

Hot water or steam-based techniques include Contained Recovery of Oily Waste, Steam Injection and Vacuum Extraction, *In Situ* Steam-Enhanced Extraction, and Steam-Enhanced Recovery Process. *In situ* biological treatment might be used after the displacement process and can be continued until ground water contaminants concentrations fulfil statutory desires.

The process can remove sizeable quantities of oily waste that has gathered in the sub-surface and can additionally slow downward and lateral movement of organic contaminants. The treatment is appropriate for shallow and deep contaminated areas, and easily available. Hot water/steam injection is normally of short to medium duration, lasting weeks to several months.

Applicability:

SVOCs and fuels can be treated via this process. VOCs may also be treated but there are more cost-effective options for this contaminant.

Gas plants, petroleum-refining facilities, and sites with soils contaminated with light to dense organic liquids, for example coal tars, creosote, and petroleum by-products can all benefit from this treatment technology.

Limitations:

- Soil type, contaminants, concentrations, geology, and hydrogeology, considerably effect process efficiency.

Data Needs:

There is a requirement for all of the generic data associated with hydrological treatment processes.

Performance Data:

Although innovative in the technology application, there are few categorical examples of the application Four US vendors are promoting hot water or steam flushing/stripping processes. The CROW technology was tested both at the laboratory and pilot-scale under the EPA SITE Emerging Technology Program. The program showed the effectiveness of the hot-water displacement and displayed the benefits from the inclusion of chemicals with the hot water.

Cost:

The most considerable factor affecting cost is duration of time needed for treatment. With a mobile system, the rate is impacted by soil type, waste type, and efficiency. On average, the cost ranges from £ 60 to £ 200 per m^3.

In static *in situ* systems, the factor influencing cost is the number of wells necessary per unit area, which is linked to depth of contamination, soil permeability and site geology. Shallow contamination necessitates lower operating pressures to stop soil fracturing and closer well placement. Deeper contamination needs higher operating pressures and larger well spacing;

as a result, fewer wells can be used, which lowers the capital cost. Estimates vary from approximately £ 30 to £ 200 per m^3, depending on site characteristics.