Ground Water, Surface Water, and Leachate

Membrane Separation

Introduction:

This organic vapour/air separation process comprises of the preferential transport of organic vapours by means of a nonporous gas separation membrane.

Description:

A high-pressure membrane separation system has been designed by DOE to treat waste streams that include dilute concentrations of VOCs. In this system, the feed stream is compressed and sent to a condenser where the liquid solvent is recovered. The condenser bleed stream, which has approximately 5,000 mg/l of VOC, is sent to the membrane module. The membrane module is comprised of spiral thin film membranes separated by plastic mesh spacers. The membrane and the spacers are wound around an inner collection pipe. In the membrane module the stream is concentrated to 3% VOC, and the stream is then returned to the compressor for further recovery in the condenser.

Applicability:

The contaminants commonly treated include VOCs, carbon tetrachloride, and chloroform present in gas streams.

Limitations:

- Inability to handle fouling constituents in soil.
- Inability to handle fluctuations in VOC concentrations.
- Membranes are sensitive to moisture.

Cost:

Capital equipment 1 cubic metre per minute is approximately £ 1.4 million, O&M is £ 4,000 (involving replacement every 3 years) and emissions treatment is £ 2,000 to £ 5,000 per kg of VOC recovered.