GASSYS: Direct in-situ and passive gas sampling from unsaturated soil and from groundwater

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Sampling of soil air is applied in exploration and contamination studies. Techniques used range from active collection, where soil gas is gathered by pumping from a borehole, to passive collection over the course of 10 days or more on buried reactive carbon or similar materials as they are exposed to soil air.

Each of those sampling methods has its disadvantages. Active sampling draws soil gas from a large undefined space near the sampling interval. This results in preferential sampling of gas flow in higher permeable systems. Hence the results do not reflect the true and undisturbed gas content at the sampling interval. Passive sampling methods usually collect gases by adsorption onto solid material. Analyses using such sampling methods are limited to determining relative gas concentrations as no direct gas sample is taken.

The newly designed passive gas sampling system GASSYS overcomes the aforementioned disadvantages. It takes quantitative and reproducible gas samples from the unsaturated soil and groundwater. Since the EVA-tube of the sampling chamber is permeable to gas but not to water, it is capable of drawing gas samples from groundwater. Up to four sealed sampling intervals can be installed within an EVA-tube at depths to 30m and more. EVA-tubes have been installed for more than 20 years without apparent loss of functionality. Hence GASSYS is well suited to monitor the progress of natural attenuation. GASSYS case histories will be presented.

K. Udo Weyer, Ph.D., P.Geol., P.HG.

Udo Weyer has over 30 years experience as a Senior Scientist and Senior Consultant dealing with hydrogeology, contaminant hydrogeology, carbon storage, mine dewatering, and subsidence in North America, Europe, and Asia. He has been involved with and supervised the utilization of geochemical and groundwater flow models to solve contaminant transport problems.

He has managed and conducted consulting work and complex field studies in a wide variety of geographical and climatological settings, from the tropics to permafrost regions. He has prepared over two hundred reports and technical papers and published a book on subsurface contamination by hydrocarbons. For several years he has been involved in studies of gases in soil and groundwater.

Helmut Kaiser, Ph.D.

Prof. Helmut Kaiser has over 30 years of experience in engineering geology and hydrogeology. He has been a teacher at the Universities of Bonn and of Erlangen in Germany. For many years he was responsible for the uranium management of Siemens AG in Erlangen.

When Siemens AG developed the leak detection system LEOS and applied EVA-based tubes along oil and gas pipelines, Helmut Kaiser used these EVA tubes for the development of GASSYS for repeated sampling of diffusing gases from soil and groundwater under controlled and unvarying conditions.