On-site component-specific detection of volatile organic components with the EnISSA-MIP

Wouter Van de Putte **(wouter.vandeputte@enissa.com); Samuel Van Herreweghe (samuel.vanherreweghe@enissa.com); Wim Vansina; and Mark Van Straaten (EnISSA – MAVA, BELGIUM)**

Chlorinated solvents have affected the quality of the groundwater and the soil in many European cities. Besides the environmental and health effects, this contamination also has huge socio-economic impacts. Because this is a common problem of densely populated areas, nine partners from Flanders (Belgium), the Netherlands, France and Germany are working together to develop an integrated approach in the **CityChlor project**. With a research budget of 5.2 million euro, of which 50% is financed by the European INTERREG IV B North West Europe programme, the partners have set up seven demonstration projects to support implementation of innovative techniques. More information can be found on www.citychlor.eu. As one of the demonstration projects in Flanders two innovative techniques for characterization of soil pollution are validated by comparing the results with 'classic' techniques on a site in the city of Kortrijk.

One of the selected techniques is **EnISSA** (Enhanced In Situ Soil Analysis; www.EnISSA.com) that is developed by **MAVA** (www.mava.be).

“On site” soil screening technologies such as the Membrane Interface Probe (MIP) are already frequently used in addition to traditional sampling methods. They are used to provide detailed screening of (semi)volatiles and allow to make on-site, real-time decisions. However, classical MIP has it's limitations: it has relatively high detection limits compared to typical risk or clean-up values and does not differentiate between individual chemical compounds.

The EnISSA technique combines the best of both the on-site and off-site “analytical worlds” by generating detailed on-site soil profile data with low detection levels and a broad analysis spectrum, thus supporting reliable dynamic sampling plans.

The EnISSA method uses a GCMS system which is connected to a direct push MIP by an innovative gas sampling system. The modified field based GCMS used is capable of cycle times of one minute, and the analysis of individual components with detection limits in the range of 10 - 20µg/l.

Demonstration scale test work indicates that it is possible to qualify and quantify pollutant mixtures every 30 cm within the time frame of conventional MIP application (assuming a conventional direct push speed of 30 cm/min). EnISSA is commercially available since mid 2010 and has already been applied by different soil experts on many contaminated sites throughout Europe. Cost comparisons indicate that the EnISSA strategy achieved 25% cost savings over conventional approaches, and also delivers a much higher density of information on contaminant distributions in the subsurface.

EnISSA, has obtained the NICOLE Award 2010 on Innovative Site Characterisation Tools (NICOLE is the Network for Industrially Contaminated Land in Europe, www.nicole.org)

The presentation presents the results of the EnISSA measurements and their comparison with traditional sampling methods on different sites among which the CityChlor pilot site in the city of Kortrijk, Belgium. The EnISSA-MIP generated a quasi continuous soil profile for individual compounds (1 measurement of up to 12 (semi-)volatile components every 30cm). The results were semi-quantitative when compared with groundwater samples. The difference between the datasets is partly due to the difference in sampling volume: a sampling well screens a part of the soil profile (1 or 2 meter) while EnISSA gives point measurements. EnISSA was also superior to sampling wells in detecting pure product zones, which are frequently present in narrow soil horizons. Finally, the presentation will show how EnISSA is capable of enhancing the conceptual site model resulting in accurate decision making.