

## Site characterisation of an LNAPL contaminated fractured-rock aquifer

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Site characterisation aims to obtain fundamental information needed to describe the subsurface flow pathways and distribution of contaminants in the aquifer. The study describes the application of various hydrogeological techniques as complimentary tools to characterise a fractured-rock aquifer contaminated with light non-aqueous phase liquids (LNAPLs). The aquifer is located in a Karoo town of South Africa. Field investigations were designed to locate preferential flow paths responsible for LNAPLs transportation and determination of the contaminants distribution in the aquifer. Core drilling and borehole geophysics were used to investigate the subsurface geology of the site. Chemical characterisation of the aquifer was achieved by means of organic hydrocarbon and inorganic water chemistry analysis. Core geological logs showed the location of vertical and sub vertical fractures contaminant preferential pathways. Two bedding plane fractures were identified at 24-25 meters below ground level (mbgl) and 34-35 mbgl using borehole geophysics and video logging. Benzene was detected in 10 of the 11 contaminated boreholes, it exceeded the maximum concentration levels (MCL) of 5 µg/l (WHO 2008) in 6 of the boreholes. LNAPL biodegradation is taking place at the site as evidenced by the reducing chemical environment. The chemical environment is characterised by elevated concentrations of Fe (II) and Mn species and depleted SO<sub>2</sub>-4 and NO<sub>3</sub>- electron acceptors. The hydrogeological structure of the formation is conceptualised as a fractured sandstone aquifer, characterised by bedding plane fracture preferential flow paths at sedimentary layer contact areas. The study shows that application of various hydrogeological tools in complementary enhances site understanding.

### Biography

Modreck Gomo completed his Ph.D in Hydrogeology at the age of 30 years from University the Free State in South Africa in 2011. He is currently a postdoctoral researcher at the Institute for Groundwater Studies of the University of the Free State. Director of a premier Bio-Soft service organization. He currently has 5 manuscripts from his Ph.D thesis under review reputed journals.

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