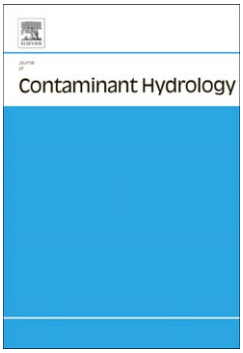

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PII: S0169-7722(17)30218-8
DOI: doi:10.1016/j.jconhyd.2017.12.005
Reference: CONHYD 3360

To appear in: *Journal of Contaminant Hydrology*

Received date: 16 July 2017
Revised date: 4 November 2017
Accepted date: 31 December 2017

Please cite this article as: Govindarajan, Dhivakar, Deshpande, Abhijit P., Raghunathan, Ravikrishna, Enhanced Mobility Of Non Aqueous Phase Liquid (NAPL) During Drying Of Wet Sand, *Journal of Contaminant Hydrology* (2018), doi:10.1016/j.jconhyd.2017.12.005

Enhanced Mobility Of Non Aqueous Phase Liquid (NAPL) During Drying Of Wet Sand

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Abstract

Enhanced upward mobility of a non aqueous phase liquid (NAPL) present in wet sand during natural drying, and in the absence of any external pressure gradients, is reported for the first time. This mobility was significantly higher than that expected from capillary rise. Experiments were performed in a glass column with a small layer of NAPL-saturated sand trapped between two layers of water-saturated sand. Drying of the wet sand was induced by flow of air across the top surface of the wet sand. The upward movement of the NAPL, in the direction of water transport, commenced when the drying effect reached the location of the NAPL and continued as long as there was significant water evaporation in the vicinity of NAPL, indicating a clear correlation between the NAPL rise and water evaporation. The magnitude and the rate of NAPL rise was measured at different water evaporation rates, different initial locations of the NAPL, different grain size of the sand and the type of NAPL (on the basis of different NAPL-glass contact angle, viscosity and density). A positive correlation was observed between average rate of NAPL rise and the water evaporation while a negative correlation was obtained between the average NAPL rise rate and the NAPL properties of contact angle, viscosity and density. There was no significant correlation of average NAPL rise rate with variation of sand grain size between 0.1 to 0.5 mm. Based on these observations and on previous studies reported in the literature, two possible mechanisms are hypothesized a) the

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