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The Volatilization of Pollutants from Soil and Groundwater: Its Importance in Assessing Risk for Human Health for a Real Contaminated Site

PDF (Size: 1454KB) PP. 1192-1206 DOI: 10.4236/jep.2011.29137

Author(s)

Pamela Morra, Laura Leonardelli, Gigliola Spadoni

ABSTRACT

Pollution of different elements (air, water, soil and subsoil) resulting both from accidental events and from ordinary industrial and civil activities causes negative effects on the human health and on the environment. The present paper examines the analysis of a contaminated site, focusing the attention on the negative effects for receptors exposed to soil and groundwater contamination caused by industrial activities. The case study investigated is a contaminated area located in the industrial district of Trento North once occupied by the Italian Carbochimica plant. Pollution in that area is mainly due to contamination of soil and groundwater with polycyclic aromatic hydrocarbons. The methodology applied is the risk evaluation for human health, in terms of individual cancer risk and hazard index. In particular the attention has been focused on a specific migration way: if pollutants in the soil or in the groundwater undergo a phase change, they spread and get to the soil surface, causing a dispersion of vapors in the atmosphere. In this case risk assessment calls for the evaluation of volatilization factor. Among the different models dealing with the estimation of volatilization factor, those mostly known and used in the national and international field of Human Health Risk Assessment were chosen: Jury' s and Farmer' s models. A sensitivity analysis of models was performed, in order to identify the most significant parameters to estimate the volatilization factors among the wide range of input parameters for the application of models. Performing an accurate selection and data processing of the contaminated site, models for the volatilization factors calculation are applied, thus evaluating air concentrations and Human Health Risk. The analysis of the resulting estimates is an excellent aid to draw interesting conclusions and to verify if the soil and groundwater pollutants volatilization affects the human health considerably.

KEYWORDS

Human Health Risk Assessment, Volatilization Models, Soil Contamination, Groundwater Contamination, Cancer Risk, Hazard Index

Cite this paper

P. Morra, L. Leonardelli and G. Spadoni, "The Volatilization of Pollutants from Soil and Groundwater: Its Importance in Assessing Risk for Human Health for a Real Contaminated Site," *Journal of Environmental Protection*, Vol. 2 No. 9, 2011, pp. 1192-1206. doi: 10.4236/jep.2011.29137.

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