

Evaluation of Groundwater Pollution with Heavy Metals at the Oblogo No.1 Dumpsite in Accra, Ghana

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Abstract

The aim of this research study was to evaluate the groundwater pollution risks from heavy metal contaminants near the de-commissioned Oblogo No.1 dumpsite using a combination of USEPA leachate estimation and migration models. The Hydraulic Evaluation of Landfill Performance (HELP) model was used to determine leachate volumes from the base of the dumpsite whereas the Industrial Waste Evaluation Model (IWEM) was used to determine contaminant concentrations at groundwater wells located at various distances from the dumpsite. It was observed that there is a wide variation in the concentration of the contaminants measured at different sampling periods between 2004 and 2011. Pollution risks from chromium, lead, manganese, cobalt and zinc were determined to be very low since the simulated contaminant concentrations in the wells were less than the reference ground water concentrations. However, the concentrations of cadmium, copper and arsenic were determined to be high enough to constitute a potential risk to groundwater wells which are down-gradient of the dumpsite. It was also determined that the minimum buffer distance of 360 m specified in the Ghana Landfill Guidelines may not ensure adequate protection for groundwater wells located down-gradient of the Oblogo No.1 dumpsite.

Keywords: water balance model, landfill cover, landfill closure, waste disposal site, Ghana

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