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APPLICATION OF ISOTOPE HYDROLOGY TO STUDY THE INTERCONNECTION BETWEEN LEACHATE-GROUNDWATER-SURFACE AND IMPACT OF LEACHATE TO THE QUALITY OF GROUNDWATER AT TAIPING MUNICIPAL SOLID WASTE (MSW) DISPOSAL SITE

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ABSTRACT

Groundwater is vulnerable to contamination from a wide variety of agriculture, industrial, and human activities. Malaysia's common sources of contamination come from landfill leaching or disposal sites, leaky storage tanks, industrial discharge pipes, septic tanks, urban runoff, liquid wastes oil spills and agricultural activities using fertilisers and pesticides. In addition, saltwater intrusion and line seepage from polluted streams or sewerage lines have great impact on groundwater quality. In a country blessed with an abundant rainfall and water resources, the possibility of contaminants reaching the groundwater is high especially in the regions with a top porous geological formation. At present, the extent of leachate infiltration and its movement in groundwater and its

discharge to surface water resources is unknown. Hence, the extent of short and long term contamination of groundwater and surface water resources is unknown. The Malaysia Nuclear Agency in co-operation with Mineral and Geoscience Department (MGD) and University Science of Malaysia (USM) had performed the study involving isotope hydrology technique as well as hydrochemical approaches to determine the cationic concentration of selected heavy metals such as chromium (Cr), manganese (Mn), arsenic (As), lead (Pb), iron (Fe), zinc (Zn) and cadmium (Cd), quality of groundwater and finally identify the interconnection of leachate to groundwater and surface water. The study showed high concentration of heavy metals such as Cr, Mn, As, Pb and Fe which exceeded the maximum permissible limits as specified in the Malaysian Drinking Water Standard of the Drinking Water Quality Act 2001. Whilst, Zn and Cd occur at low concentrations in the groundwater. The interconnection between leachate, groundwater and surface water contamination also can be observed in the study area based on isotope data. However, the distributions of contaminants were localized and confined within the dumping area and not diffused over a wide area. The tritium content in groundwater samples indicated that most probably water of modern groundwater.