

ABSTRACT

FINITE DIFFERENCE MODELING OF LEACHATE SPREADING AT JATIBARANG LANDFILL

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The spread of leachate generated by waste at Landfills (TPA) is a serious environmental phenomenon. The pollutants produced often contain high concentrations of heavy metals such as cadmium (Cd) and copper (Cu), which can impact the health of surrounding communities. Therefore, this study aims to analyze the leachate distribution pattern, so that areas with high concentration zones can be mapped. Jatibarang Landfill, a natural landfill, was selected as the field research site, allowing the advection process to be disregarded. The diffusion process is represented through a finite difference model approach, and the Forward Time Central Space (FTCS) scheme is used to discretize time and space in two dimensions. The diffusion coefficient is calculated using Mean Squared Displacement (MSD) based on the concentration values of heavy metals at sample points. Linear interpolation is employed to determine the concentration values around the central source point, thus illustrating the spread pattern. Simulation results using Matlab software show that the diffusion process occurs in the area surrounding the leachate source. Cadmium spread widely from the leachate source to each terminal, while copper spread more locally around the leachate source. The highest risk zones are located around the leachate source center.

Keywords: Cadmium, Copper, Diffusion Process, Forward Time Central Space, Linear Interpolatio