

## **The retention capabilities of soils at Batang Berjuntai and Ampar Tenang as natural clay liners for landfill systems using leaching column test and selective sequential extraction analysis**

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**Abstract:** Clay liners have the ability to interact chemically with leachate. If suitable clay liner can be identified, it can help to attenuate the migration of leachate to groundwater and surface water. In this study, leaching column tests were used to determine the retention capability of heavy metals for two types of soils collected adjacent to a landfill in Selangor. The active landfill sites chosen are Kg. Hang Tuah in Batang Berjuntai (HMS) and Ampar Tenang, Sepang (ARA) where the HMS samples are metasediment soil and ARA samples are river alluvium soil. Selective sequential extraction (SSE) was used to study the retention mechanisms of heavy metals in the soil columns obtained from leaching column test experiments. Acid digestion was later used to check the validity of the SSE results. Breakthrough curves for metasediment soil from Kg. Hang Tuah show good retention of heavy metal ions with relative concentration, Ce/Co (10<sup>-1</sup> - 10<sup>-5</sup>) compared to river alluvium soil from Ampar Tenang with relative concentration, Ce/Co (10<sup>-1</sup> - 10<sup>-4</sup>). This corresponds with the pH of the effluents and the pore fluid where the HMS samples are more alkali compared to ARA samples. Generally, HMS and ARA samples have same ranked order of buffering capacity; Cu>Zn>Pb>Ni. The distribution of the heavy metals with soil constituents are ranked in the following phases: Exchangeable > Carbonates > Hydroxides > Residuals > Organics