

Landfill Failure Mobility Analysis: A Probabilistic Approach

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Abstract : Ever increasing population growth of major urban centers and environmental challenges in siting new landfills have resulted in a growing trend in design of mega-landfills some with extraordinary heights and dangerously steep slopes. Landfill failure mobility risk analysis is one of the most uncertain types of dynamic rheology models due to very large inherent variabilities in the heterogeneous solid waste material shear strength properties. The waste flow of three historic dumpsite and two landfill failures were back-analyzed using run-out modeling with DAN-W model. The travel distances of the waste flow during landfill failures were calculated approach by taking into account variability in material shear strength properties. The probability distribution function for shear strength properties of the waste material were grouped into four major classed based on waste material compaction (landfills versus dumpsites) and composition (high versus low quantity) of high shear strength waste materials such as wood, metal, plastic, paper and cardboard in the waste. This paper presents a probabilistic method for estimation of the spatial extent of waste avalanches, after a potential landfill failure, to create maps of vulnerability scores to inform property owners and residents of the level of the risk.

Keywords : landfill failure, waste flow, Voellmy rheology, friction coefficient, waste compaction and type

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