



**INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS**

Name of the Student : Sudheer Kumar Yamsani

Roll Number : 136104005

Programme of Study : Ph.D.

Thesis Title: "Performance evaluation and stability analysis of multi-layered cover system for near-surface hazardous waste disposal facility"

Name of Thesis Supervisor(s) : Dr. S. Sreedeeep

Thesis Submitted to the Department/ Center : Department of Civil Engineering

Date of completion of Thesis Viva-Voce Exam : 18/06/2018

Key words for description of Thesis Work : Multi-layered cover system (MLCS), performance, erosion, stability.

SHORT ABSTRACT

Hazardous and toxic waste necessities engineered landfill (near-surface waste disposal facility) with multi-layered liners and cover system, to eliminate its ill effects on surrounding environment. Multi-layered cover system (MLCS) essentially isolate the waste components from atmospheric interaction, which is vulnerable to the continuous climatic variations like rain and temperature. This study hence attempts to evaluate the optimal soil and its compaction state that could exhibit superior performance when used as surface soil in MLCS. Infiltration of rainwater from surface layer likely clogs the filters and drains present beneath affecting the persistence of MLCS. Long-term hydraulic performance of geotextiles used in filters and drains were therefore evaluated. However, observing the long testing period's effort is made to establish the efficiency of geotechnical centrifuge for quick analysis of the same. Field studies on pilot MLCS are very few and such studies are essentially needed considering the significance and cost incurred in building such facilities. This research also tried to evaluate the performance of surface soil under natural and simulated rainfall events. The results depicted the efficiency of vegetation in resisting the erosion of surface soil. In addition, the study on estimation of erosion using revised universal soil loss equation (RUSLE) was found to be appropriate if used on annual basis. The readiness of different soil-soil and soil-geotextile interface to undergo slippage motivated to extend the available equations for evaluating stability of uniformly laid soil over geotextile layer to apply for multi-layered cover system. Revised equations are then used to establish the design charts that would ease the filed practitioners to assess the stability of MLCS. This study introduces comprehensive issues that degrade the existence of MLCS and attempts to address prime concerns such as surface erosion and stability. Further studies are needed to understand the operational concerns of MLCS in widely varied Indian sub-continental climatic conditions.