Sandia National Laboratories

Environmental Program

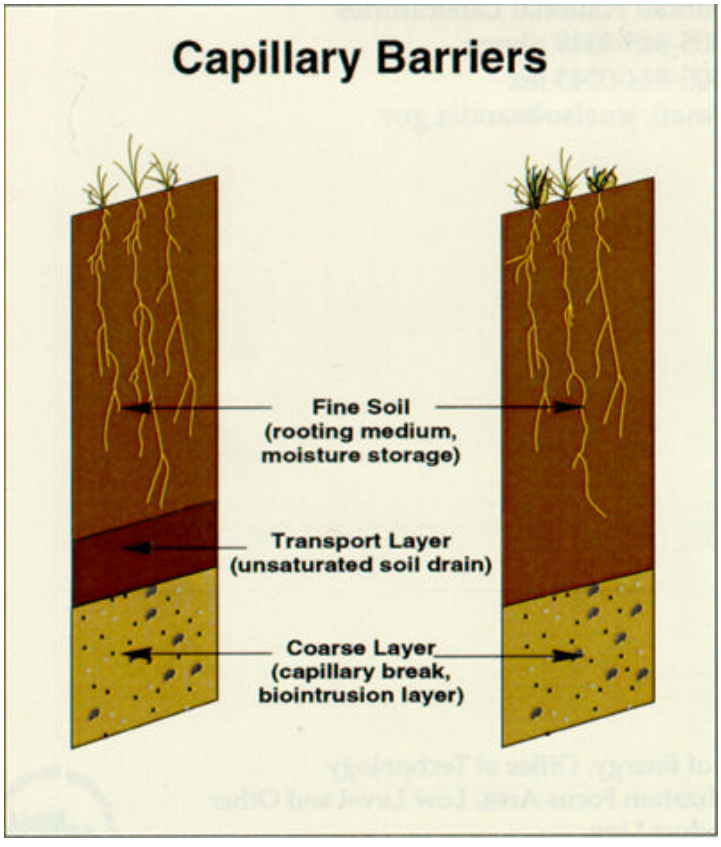
Demonstrate Capillary Barrier Landfill Cover Concepts

Technology Need

Surface covers are an important component in the isolation strategy of waste management methods. Landfills, surface impoundments, waste piles, and some mine tailings are required to be covered with an engineered cover or cap upon closure. Conventional covers can be expensive, difficult to construct, and of questionable long-term performance. Capillary barriers, consisting of fine-over-coarse soil layers, have been suggested as an alternative component for surface covers, but they have not been widely applied, and their performance has not been fully demonstrated. Although a relatively simple configuration, a capillary barrier should result in a long-lived, easily constructed, and low-cost barrier in comparison with many conventional cover systems.

Objectives

The overall objective is to increase the consideration of capillary barriers as components of surface cover designs in many landfill closures by demonstrating the performance of capillary barrier concepts through a cooperative field effort with the Bureau of Land Management. Project goals include demonstrating numerical analysis tools for capillary barriers based on the existing model for conventional barriers and conducting a field demonstration of these concepts.



Project Description

This project involves demonstrating capillary barrier landfill cover concepts in a cooperative effort with the Bureau of Land Management (BLM), at the Lee Acres landfill near Farmington, NM. This includes designing and analyzing a capillary barrier for Lee Acres. The design includes laboratory characterization of candidate soils, numerical modeling, performance predictions using advanced unsaturated flow tools used in previous Sandia National Laboratories (SNL) capillary barrier research, and specification and installation of in situ instrumentation to monitor the performance of the deployment. Based on preliminary recommendations, the size of the deployment at Lee Acres will cover an area of approximately

33,000 sq. ft. The design, analysis, and implementation of the Lee Acres deployment will use tools and instrumentation developed and demonstrated during previous SNL laboratory, field, and analysis activities.

Advantages

A capillary barrier costs less than a conventional barrier because it emphasizes use of natural processes such as vegetation for evapotranspiration (removing water from soil via evaporation from plants). It is also more stable because it emphasizes use of natural materials and configurations, which implies longevity. A capillary barrier retains more water than undisturbed topsoil. This condition encourages plant growth, which in turn limits erosion and removes water from soil.

Costs

The simple configuration of a capillary barrier should result in a lower cost than most other cover systems. These costs are currently determined on a case-by-case basis because of construction material availability and design requirements at various site locations.

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