

Evaluation of Changes in the Hydraulic Properties of Final Landfill Covers

Paul Schlicht, Research Assistant
Craig Benson and James Tinjum, Advisors

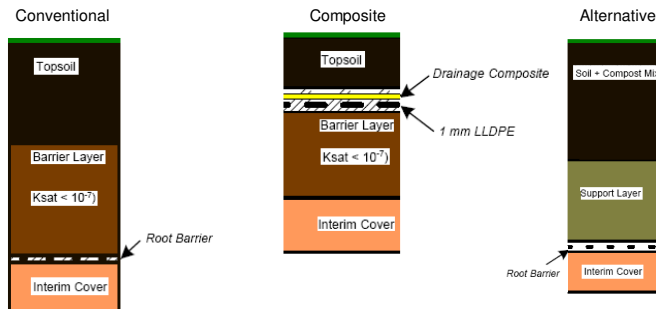
Problem Statement

- Landfill final covers are designed to isolate solid waste from the surrounding environment and minimize water percolation into the waste
- Low permeability clay layers have typically been used in covers to prevent percolation
- Soil structures develop in the clay causing an increase in permeability, rendering the cover ineffective

Project Background

- Large scale landfill cover simulations were built at 11 locations throughout the US
- Each location had several simulated covers with varying designs for side-by-side comparison

Example Cover Simulation Profiles



- Site operation time varied from 4 to 9 years

Research Objectives

- Quantify the change in hydraulic properties that occurs over the lifetime of a landfill cover
- Determine the effect of scale on the measurement of saturated and unsaturated hydraulic properties
- Identify the environmental factors that have the greatest affect on hydraulic properties
- Recommend cover materials and designs that are most suitable for different regions

Methodology

Field Testing

Sealed Double Ring Infiltrometer



Two Stage Borehole



Laboratory Testing

Saturated Hydraulic Conductivity

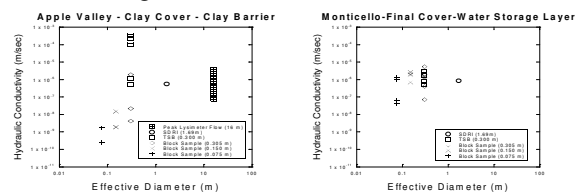


Pressure Plate Extractor



Preliminary Results

- Hydraulic conductivity varies over a large range with changing scale for some sites and a smaller range for others



- A large range is indicative of structural development
- Future analysis will focus on determining the factors responsible for structural development

Acknowledgments

Financial support for this study was provided by the National Science Foundation, the US Nuclear Regulatory Commission, the US Environmental Protection Agency, the US Department of Energy, the Environmental Research and Education Foundation, Colloid Environmental Technologies Corporation, Veolia Environmental Services, and Waste Connections, Inc.