

Soil Protection by Polymer Enhanced Mineral Barrier (Applications and New Developments)

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Mineral barriers are extensively used in various applications to protect the environment from hazardous substances in the form of liquids (leachate) and/or gas. Mineral barriers can be used either independently or in combination with other sealing components. Traditional thick mineral barriers are often the preferred option due to their robustness and their high, natural durability. The EU council directive prescribes that protection of soil, groundwater and surface water is to be achieved by a mineral layer at the base and sides of the landfill which meets specified requirements for the protection of soil groundwater and surface water in combination with a top liner during the passive/post closure phase. In addition a leachate collection and sealing system must be added during the operational/active phase consisting of an artificial sealing layer and a drainage layer.

The most commonly used mineral barriers are Compacted Clay Liners (CCL) and Bentonite Enriched Soils (BES). Geosynthetic Clay Liners (GCL) are mainly used as a top liner.

When used under the right circumstances all systems can achieve good results, however all sealing systems, mineral barriers as well as geomembranes, have certain limitations. It is necessary to understand these limitations in order to avoid any unpleasant surprise occurring during their entire functional working life. This article focuses on mineral liners and thus the pros and cons of geomembrane are not discussed at the same time.

Three aspects that might adversely affect the functionality of such mineral liners are (1) strain arising from differential settlement of the waste body and (2) crack formation due to desiccation and shrinkage and (3) reduction of swelling capacity caused by changes of the initially sodium rich cation composition of the clay complex.

New concepts have been developed to improve the properties of the mineral barrier in order to cope with such detrimental effects. On Trisoplast, as one of these modified mineral barriers, intensive independent testing has proven that the performance of the mineral material can be significantly improved in several aspects by making use of this special bentonite-polymer technique. Trisoplast offers a prolonged functional lifetime, which is particularly relevant for landfill and contaminated land applications where the lining system is exposed to severe conditions such as chemical attack and mechanical stresses.

Mike Naismith

Mr. Naismith finished his studies of hydrological and engineering geology at the “Rheinsich-Westfälischen Technischen Hochschule Aachen”, Germany in 1992. After some years of working as an independent consultant in the field of ground engineering, specializing in landfill and contaminated land projects, he started working as technical consultant and international manager within the geosynthetic industry dealing with various projects and partners all over the world. In 2002 he joined GID Milieutechniek BV (Trisoplast Mineral Liners) as business development manager taking care of their foreign activities and introducing and establishing Trisoplast as a state of the art mineral lining system to a largely increasing number of countries.