



KAYTECH CASE STUDY

EMERGENCY CONTAINMENT PLATFORM USING A GEOSYNTHETIC COMPOSITE LINER SYSTEM AT A PLATINUM MINE

GEOSYNTHETICS USED

bidim®: A continuous filament nonwoven needlepunched geotextile.

bidim® A10: Installed above the geomembrane as a protection layer to reduce puncture risk from the overlying fill material.

EnviroFix®: A Geosynthetic Clay Liner (GCL) consisting of powdered sodium bentonite encapsulated between geotextile layers.

EnviroFix® X800: Installed as the secondary containment layer beneath the HDPE geomembrane.



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PROJECT DESCRIPTION

At Two Rivers platinum mine, an emergency stockpiling platform was required to maintain operational continuity during potential conveyor stoppages. Unprocessed ore needed to be temporarily stored in a controlled area without posing a risk of environmental contamination. The platform therefore required a reliable containment system capable of minimising leakage while supporting heavy loads from stockpiled material and operational equipment. A composite geosynthetic lining system was specified to provide durable containment and maintain environmental protection.

A BETTER SOLUTION

Composite liner systems are widely used in containment facilities because they combine the strengths of geomembranes and Geosynthetic Clay Liners (GCLs). The geomembrane provides an essentially impermeable primary barrier, while the bentonite layer within the GCL forms a secondary sealing layer with extremely low hydraulic conductivity once hydrated (Koerner, 2012; Rowe, 2014). This combination significantly reduces leakage potential and improves containment reliability compared with single-layer systems (Giroud & Bonaparte, 1989; Daniel & Koerner, 2007).

For the emergency platform, Bopcons, a subcontractor to WBHO, installed EnviroFix® X800 GCL beneath a high-density polyethylene (HDPE) geomembrane to form the composite containment barrier. The GCL also provided a cushioning effect, helping protect the geomembrane from potential subgrade irregularities. After installation of the HDPE liner, a protective layer of bidim® A10 nonwoven geotextile was placed above the geomembrane to reduce puncture risk from the overlying material. A 1m layer of imported fill was then placed and compacted in stages, ensuring adequate confinement of the lining system while creating a stable operational platform.

The completed platform provides a secure containment area for temporary ore storage during conveyor interruptions. The composite lining system ensures reliable environmental protection while maintaining structural stability under significant stockpile loads. The use of geosynthetics reduced the need for thick compacted clay layers and simplified construction. This approach enabled efficient construction while delivering a durable containment facility capable of supporting ongoing mining operations.



EnviroFix® GCL pulled into position prior to installation.



EnviroFix® being deployed to form part of the composite containment system.

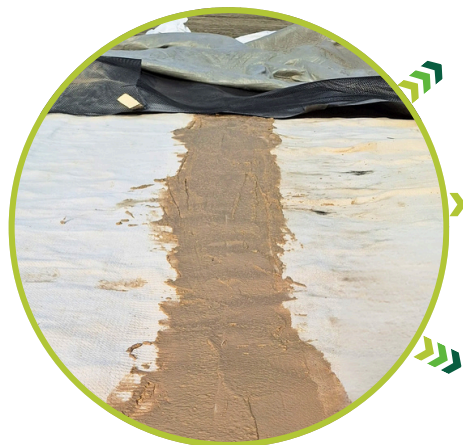


bidim® geotextile in place beneath the overlying fill material for protection.



bidim® geotextile being rolled out over the subgrade prior to liner placement.

Did you know?



Powdered Bentonite Advantage

Powdered bentonite distributes more uniformly within a GCL and hydrates rapidly, helping form a continuous low-permeability barrier (Koerner, 2012).



Self-Sealing Behaviour

When hydrated, sodium bentonite can swell several times its dry volume, allowing GCLs to seal small defects and maintain low permeability.



Hydraulic Conductivity

GCL performance is measured by hydraulic conductivity, rather than bentonite mass. When properly confined and hydrated, sodium bentonite typically achieves permeability values in the order of 10^{-9} to 10^{-11} m/s (Daniel & Koerner, 2007; Rowe, 2014).