

CAPPING OF A GOLD MINE IN ROSIA MONTANA, ROMANIA

ABSTRACT

Rosia Montana has always been rich in mineral resources, especially in gold. Unfortunately the accident at Baia Mare in 2000 brought home to Romanians the dangers of cyanide leaching due to the use of this chemical for gold mining. As a consequence waste material derived from mining operations had to be capped to avoid water to move easily through this material.

Traditionally a capping construction involves large quantities of natural materials such as clay (waterproofing), gravel (drainage) and sand (filter and separation). These materials are scarce in the environment and are difficult, expensive and slow to place, especially on slopes. In the capping of Rosia Montana's gold mine, discussed in this case study, the final capping design was based on the placement of a drainage geosynthetic for rainwater drainage and a high density polyethylene geomembrane for waterproofing.

ROSIA MONTANA'S GOLD MINE CAPPING	
JOB	CAPPING OF A GOLD MINE IN ROSIA MONTANA
PROVINCE	TRANSYLVANIA
COUNTRY	ROMANIA
CLIENT	ROMANIA MINISTRY OF TRANSPORT AND INFRASTRUCTUREFOUNDED BY THE EUROPEAN COMMUNITY
PRODUCTS	INTERDRAIN GM 412
MANUFACTURER	INTERMAS NETS
CONSTRUCTOR	SELINA
INSTALLER	CON-CYN CONSTRUCT SRL







For over two decades geosynthetics manufactured by Intermaas Nets have been used in cappings with great success around the world due to their many advantages over natural elements:

- Geosynthetic's reduced thicknesses allow a greater volume of operation.
- They can be installed in steep slopes.
- Due to their low weight they significantly reduce surcharge.
- Homogeneous properties as they are industrial products.
- Comfortable, quick and easy to install and they require no heavy equipment.
- They are a better solution for the environment, constituted by safe, non-polluting and recyclable materials.

1. PROBLEM

The projected capping for Rosia Montana's gold mine had to cover 170,000 m² guaranteeing several factors:

-  Full capping waterproofing.
-  Rainwater drainage.
-  Topsoil cover to reduce superficial erosion and improve aesthetics.
-  Long-term stability for the capping with a slope inclination of 2,5H:1V.



2. SOLUTION

The final capping design was based in the placement of a regularization soil cover over the waste material, a HDPE geomembrane for waterproofing and a drainage geocomposite for rainwater drainage.

MATERIALS, THICKNESSES AND FUNCTIONS OF THE DIFFERENT CAPPING LAYERS IN THE GOLD MINE			
MATERIAL	THICKNESS	PRODUCT	FUNCTION
Topsoil	20 cm	-	Reduce superficial erosion and improve aesthetics
Soil cover	20 cm	-	Sealing layer
Drainage Geocomposite	< 1 cm	IINTERDRAIN GM 412	Filter+Drainage (rainwater)+Waterproofing. Protection. Eliminates hydrostatic pressure
Smooth HDPE Geomembrane	< 1 cm	-	Waterproofing- Prevents leachate to infiltrate in the ecosystem
Soil	30 cm	-	Regularization and slope formation
Waste material	-	-	





3. USED PRODUCTS

Rainwater drainage







INTERDRAIN GM 412, a product manufactured by Intermas Nets, SA was placed as rainwater drainage layer. It is constituted by a high-density polyethylene (HDPE) geonet and 1 polypropylene (PP) geotextiles heat-bonded to the net. The geonet is formed by two over-crossed strands at 60°, whose geometry creates channels with high flow capacities even under high pressures and at very low gradients (placed almost horizontally).

The geonet's main function is drainage while the geotextiles act as waterproofing protection, filter elements and fine particle anti-pollutants.






The main reasons why INTERDRAIN GM 412 was selected are:

-  High flow capacity.
-  High tensile and crush resistance which allow usual construction loads (vehicle traffic, compacting process, tensions due to land disposal, etc.) without any damage in the product.
-  Excellent creep and fatigue behavior that guarantees a long-term drainage solution.
-  Durability. PP and HDPE are chemically inert, imperishable and not sensitive to saline water or microorganisms.

4. INSTALLATION PROCESS

-  Extension and compaction of a soil layer for waste regularization.
-  Opening of geosynthetic anchor trenches on the crest of the slopes.
-  Installation of HDPE geomembrane. In general, seams must be oriented parallel to the line of the maximum slope. The membrane must be overlapped prior to seaming to affect a good weld and allow for proper testing with a minimum overlap of 7.5 cm.
-  Placement of INTERDRAIN GM 412 for rainwater drainage. In case of adverse climate conditions (wind) it is convenient to join the geotextiles with a hot-air gun to prevent lifting. Each roll includes the 10-cm geotextile overlap.
-  Extension and compaction of a 20 cm thick soil cover.
-  Extension and slight compaction of a 20 cm thick organic topsoil cover.

5. CONCLUSIONS

-  The use of INTERDRAIN drainage geocomposite and HDPE waterproofing is suitable for mine cappings.
-  Long-term stability of the capping. Stability was not an issue in this job because the slope inclination was considerably low (2.5H:1V).
-  INTERDRAIN's flow capacities are reliable, homogeneous (industrial products) and can substitute gravel layers (products with heterogeneous characteristics).
-  Geosynthetics usage in cappings is a better environmental option because PP and HDPE are non-polluting products and 100% recyclable. On the other hand, large quantities of natural materials are needed, which are scarce elements in nature and whose extraction creates a great environmental impact.
-  Geosynthetic installation is fast, easy and economic.