

Bentofix®
Carbofol®
Secudrain®
Secutex®

Tailings

Project
Sealing of a Tailings Storage Facility (TSF)
in South-East Europe

Installation period
2017 - 2021

Products:
Bentofix® NSP 4000
Bentofix® NSP 5300
Bentofix® X5F NSP 4900
Carbofol® 406 2.0 mm s/s
Secudrain® 201 WD 601 201
Secutex® R 1001





Fig. 1: Top view of TSF



Fig. 2: System of different sub-areas

Challenge

The mining company planned in 2017 to expand its cascades of tailings ponds with the new construction of the tailings storage facility (TSF).

The responsible authority (Ministry of Environment) decided that the bottom and side slopes had to be lined. The purpose of the sealing system is to prevent dangerous substances and heavy metals from infiltrating into the environment. The initial dam was followed by a downstream dam constructed with the coarse sand fraction of the tailings. The challenge was essentially the complex geometry of the construction project.

The first step was to seal the main downstream dam. This dam is approx. 60m high and has two approx. 50m long slopes with a general inclination of approx. 20° and is entirely built of sandy tailings.

The slope area of the western side is a system of different sub-sectors consisting of weathering material and rocky slope parts. The maximum height is approx. 58m. Three working platforms were erected so that the geosynthetics could be installed - for the purpose of accessibility. The sub-sectors have different inclinations. Sectors 1 and 2 have a general inclination of approx. 37°, sectors 3 and 4 of approx. 42° - 45° and sectors 5 and 6 of approx. 45°. Sectors 2, 5 and 6 are steep rock sections, some almost vertical.

Solution

The consultants of the mentioned authority compared different possible solutions and finally preferred our geosynthetic solution. Naue Bentofix® and Carbofol® were selected as the composite sealing system. Naue Secudrain® was selected for the section with drainage requirements (below the sealing system in steep slope areas). The geotextile Secutex® was determined to protect the sealing components.

More than 300,000m² of Naue products were supplied and installed in this mining application.

The main challenge was the installation and placement of geosynthetic material in sections with steep and rocky parts. The total construction area of the western slope was approx. 21.000 m². On approx. 7.000 m², there were steep rock sections, especially in the upper parts. It was decided to fix this area's sealing system with a special anchoring system. For this purpose, 0.6m long, cemented rock bolts with a diameter of 20mm were used. A total of 394 anchors were installed in this section to fix the sealing system in the upper part of the embankment.

Certified installers carried out the geomembrane welding with the safety equipment of industrial climbers. All activities, such as the selection of products, storage, transport, installation and testing of geosynthetics, were carried out following state-of-the-art international guidelines, Naue's installation manuals, the installation company's QA plan and within the specified schedule.

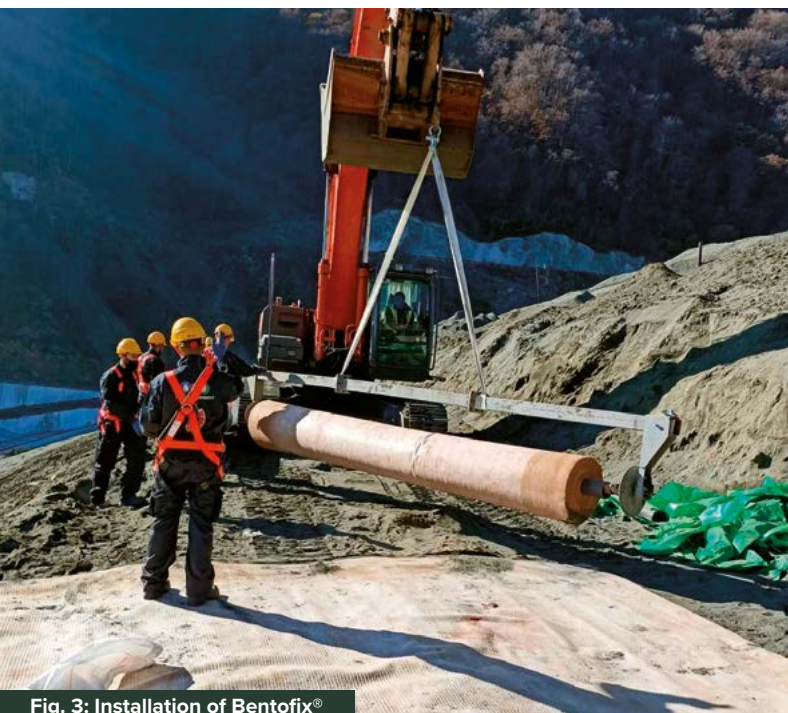


Fig. 3: Installation of Bentofix®



Fig. 4: Installed GCL Bentofix® (bottom) and drainage mat Secudrain® (top)