



CASE STUDY

Trekkopje Reservoirs

Erongo Region, Namibia

Reinforced Earth® Reservoir

Owner: Uramin

Engineer: Turgis (DHV)

Contractor: Target Projects

Construction: Reinforced Earth Pty Ltd
South Africa

Date: 2008

Background

The Trekkopje Uranium Mine is situated 20km north of Arandis in the Erongo region of the Namibian desert. The reservoirs are part of southern Africa's largest seawater desalination plant and hold desalinated, potable water pumped from Walvis Bay.

Namibia has one of the driest climates in the world so when Areva Resources sought to open its new open cut uranium mine it explored several water supply options, including groundwater and surface water. Sources proved to be insufficient to meet the mines requirement and a decision was taken to develop a desalination plant instead. The desalination plant was designed not only to accommodate the mine's requirements but also for possible future water supply to other uses in Erongo.

The intake system for the desalination plant draws seawater from the ocean, 1 km offshore, and caters for a future potential water demand of 45million m³ per year. The stabilised water flows from the desalination process into a 2000 m³ small on-site pump station surge tank before being pumped overland to the mine 50 km away. The water is transported via two booster pump stations to the terminal reservoirs at

the mine at an elevation of 520 m above mean sea level.

The Reinforced Earth Company South Africa was contracted to design and supply two Reinforced Earth® Reservoirs to hold 54 000 m³ of desalinated potable water.

Challenges

The reservoirs are constructed in an area with reduced durability factors generally brought about by harsh environmental conditions such as temperature and chemical exposure. The reinforcement strips need to be protected from UV degradation and highly corrosive backfilling materials. To ensure watertightness the cladding joints needed to be sealed and the liner secured to the concrete facing panels.

Solutions

The structures are constructed utilising the GeoMega® system and are lined with a membrane to ensure watertightness. The GeoMega® system allows retaining structures to be constructed in chemically aggressive environments by the combination of a fully synthetic connection between the synthetic GeoStrap® soil reinforcements and 1.5m square un-reinforced concrete facing panels. The proprietary synthetic connection consists of an injection-moulded, polyolefin



Main picture: Aerial view of Trekkopje Reservoirs

Above first picture: Strength testing the panels under the effect of the tensile load of reinforcements.

Above second picture: Reservoir surface



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Mining infrastructure



sleeve embedded in the concrete facing panels. The GeoStrap® is manufactured by placing high tenacity polyester yarn in bundles and then extrusion-coating them with polyethylene. The elements making up the system have been subject to rigorous specifications, quality control and numerous strength tests. Friction of the synthetic strip was verified in both in-situ and laboratory tests using calibrated extraction systems (as pictured on the previous page). The effect of UV degradation is minimal as the strips are only exposed to sunlight during installation and the polyester yarns in the GeoStraps® are protected from any exposure to the alkaline environment in the concrete panels as they are threaded through GeoMega® sleeves. During the casting of the concrete panels, in addition to the moulded sleeve for the anchorage of the reinforcing strips, an anchor knob sheet was cast into the panels. HDPE pipe was inserted into the joints and by using square panels to minimize the number of joints.

The liner was supported sufficiently to ensure the watertightness of the structures. After construction of the walls the lining was welded onto the anchor knob sheets situated at the top of the walls.

Conclusion

The Trekkopje reservoirs have enabled the delivery of desalinated potable water to a harsh environment 50 km from the coast and have facilitated a viable solution to water supply in mining applications.



Above: 3D drawing of a Reinforced Earth® structure.

Project specifications

System Reinforced Earth® - with 14cm unreinforced concrete panels

Finish Waterproof Membrane Liner

Soil Reinforcement GeoStrap5®

Structures 2 Reservoirs

Dimensions 2 No 64.5m square with 10 m common divided

Length/Width 2 No 64.5m X 64.5m

Height 7.5m cladding, 0.5m embedment, 6.5m water, 0.5m freeboard

Design life 70 years

Capacity 54,000m³