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South Africa

Anglo American eMalahleni Water Reclamation Plant –
Winner of WCA Award for Excellence in
Environmental Practice 2013

The eMalahleni Water Reclamation Plant has turned a major liability into a valuable asset that has created far-reaching benefits for the environment, the local community, and the collieries that supply the plant.

Anglo American has invested almost US\$100 million in a water reclamation plant to treat underground water from its mining operations situated in the Witbank coalfields of South Africa's Mpumalanga province. The plant currently treats 25-30 million litres a day. Some of this is used in its mining operations but the bulk of it supplies 12% of the city's daily water needs. To date, the water reclamation plant has treated in excess of 50 billion litres of water and supplied 35 billion litres to the eMalahleni Local Municipality.

Approximately 140 million m³ of water is stored in Anglo American's underground workings, a figure that is rising by over 25 megalitres per day. A wide range of options to manage this water has been maximised and exhausted over a considerable period; the company therefore undertook extensive research into various treatment solutions, with desalination being one of them.



Some of the gypsum waste product from the eMalahleni Water Treatment plant is used to make bricks to build affordable housing for Anglo American employees

Over a decade of research and development, and working with various partners has resulted in the plant moving towards being a near-zero waste facility, providing a sustainable solution that benefits the communities that reside around Anglo American's mining operations.

Commissioned in 2007, the plant desalinates rising underground water from Anglo American's Landau, Greenside and Kleinkopje collieries, as well as from BHP Billiton Energy Coal South Africa's (BECSA's) defunct South Witbank Mine. By doing so, it prevents polluted mine water from decanting into the environment and the local river system, while also alleviating serious operational and safety challenges.

Additional water is piped to Greenside, Kleinkopje and Landau collieries as well as various nearby Anglo American service departments for domestic use and for mining activities, such as dust suppression. These operations are now self-sufficient in terms of their water requirements, which eases the serious supply problems of the local municipality.

The plant also supplies eight megalitres of potable water per day to Zondagsfontein, an Anglo Inyosi Coal greenfield project, BECSA's Klipspruit mine and the Phola coal washing plant, a joint venture between the two mining houses.



The expansion project at the eMalahleni Water Treatment plant, set to effectively double the capacity of the plant

Critical need for water

The eMalahleni Local Municipality has long grappled with supply and demand problems to cater for the water needs of an area experiencing considerable industrial, commercial and residential growth. The plant is aiding the provincial government in meeting its Millennium Development Goal to ensure that every household will have access to reliable drinking water. With the help of the plant, the percentage of homes without drinking water has been reduced from 14% to 2%.

Apart from benefiting the local community by supplementing the low domestic water supply, it has created a number of job opportunities. During the construction phase, between 650 and 700 temporary jobs were created, while 40 permanent positions were created for the running of the plant. Eighty-six percent of the workforce comprises Historically Disadvantaged South Africans, while 91% have been sourced from surrounding communities in an area of high unemployment.

Zero waste facility

Besides the plant having more than a 99% water recovery rate and very low brine volumes, the 200 tons of gypsum by-product that is produced daily at the plant can be turned into a low-cost, high quality construction material. Following rigorous testing and approval, it has been used to construct 66 affordable houses for local Anglo American employees, with an additional 300 houses currently under construction. South Africa's backlog in low-income housing delivery, combined with the construction boom in recent years, makes alternative building materials derived from waste particularly attractive.

In addition, the plant offers an opportunity to further stimulate local employment through the establishment of a community-based enterprise that will manufacture and distribute these gypsum-based products to local builders. The remainder of the gypsum not used in this process is sold to the cement and agricultural industries, eliminating solid waste disposal at the plant.

Anglo American has launched two \$1.6 million research and development projects that may offset the cost of the water treatment facility and reap further financial and environmental benefits.

The first study, which is being co-funded by the National Research Foundation's Technology and Human Resources for Industry Programme, is looking into the conversion of waste gypsum into sulphur, limestone and magnesite.

It is currently undergoing a range of tests to prove its quality and social acceptance, and should the project be successful it is envisaged that a black empowered entity will be created to manufacture and market gypsum building products on a mass scale.

The second is investigating the by-product's use in the production of usable mining and building products. The local banking sector has been mandated by government to provide assistance in eliminating the country's massive backlog in housing, which has spurred them into seeking alternative building materials. The boom in the construction industry has caused conventional resources such as bricks and

cement to be in short supply, and has driven up the cost of housing. As part of this study, the company has built a three-bedroom house constructed almost entirely out of gypsum-based building products.

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Future developments

In July 2011, Anglo American approved an investment to increase treatment capacity to 50 million litres a day (with a maximum capacity of 60 million litres); this second phase is expected to be operational before the end of 2014.

Once complete, the expanded plant will manage water from up to six coal mines, some of which will soon reach the end of their lives. A holistic approach to dealing with the water problems of the entire region is needed; therefore, Anglo American is collaborating with other mining companies through various fora to identify regional opportunities to address the water problem.

The project has been designed to take into account the remaining 20 to 25 year life of contributing mines, and to cater for post closure liabilities, which will require the desalination of mine water in excess of 30 million litres per day. The plant will continue to run long after mine closure.

The project is replicable and is being evaluated as a water treatment solution by six of Anglo American's ten operations. It has already been replicated by private mining company, Optimum Coal Holdings, who commissioned a 15 million litres a day plant in June 2010 to the east of eMalahleni. Four other projects in the Witbank coalfields are in various stages of project development based on the same model as the eMalahleni plant.

Awards & recognition

During 2007, the plant won two categories of the Mail & Guardian's Greening the Future Awards (innovative environmental strategies that improve business performance and water care) and the sustainability category



The houses are built with bricks made from a percentage of gypsum, produced as a waste product at the eMalahleni Water Treatment plant. Pictured is Kholofelo Mawela, a first time home owner

of Nedbank Capital's Green Mining Awards. These awards seek to recognise mining and beneficiation companies for their contribution to sustainability and the environment. In 2011, the eMalahleni Water Reclamation Plant was selected as the winner of the 'best community project in Africa' category of the Asia Mining Global Sustainability Awards. The plant was also the only mining initiative to be endorsed by the United Nations Momentum for Change initiative at COP17.

In 2013, Anglo American won the WCA Award for Excellence in Environmental Practice, which recognises outstanding contribution in the area of reducing the environmental footprint of coal, at any stage of the coal value chain.

Find out more

To read more about Anglo American visit: www.angloamerican.co.uk

To find out more about the World Coal Association and our work, visit www.worldcoal.org or email info@worldcoal.org

To find out more about the WCA Leadership & Excellence Awards, visit www.worldcoal.org/awards