

The eMalahleni Water Reclamation Plant in South Africa

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“We are moving beyond seeking solutions purely for our own mines, and aim to assist in finding holistic ways of dealing with the water problems of the entire region” –Thubendran Naidu (Anglo American, eMalahleni)

Abstract

Mining is always a challenge, especially in water stressed regions. Safety and environmental problems caused by rising underground mine water in eMalahleni were addressed by mining operators implementing a water reclamation system. Currently, the plant purifies 30 Ml/d to potable quality and covers almost 20% of the total potable water demand. eMalahleni is an example of how wise water management can provide a common solution by addressing interests of both the mining industry and the local community.

Background

eMalahleni is located in the Nkangala District Municipality of Mpumalanga province, South Africa. The area can be characterised as water-stressed due to a growing population and climate-change induced reductions in annual rainfall, which has increased pressure on the drinking water supply for the city. The city is already struggling to meet the water demand by extracting 120m³/day from the local Witbank Dam, exceeding the licensed withdrawal volume of 75 m³/day. According to the current prognosis, this volume is going to increase to 180 m³/day by 2030 (International Council on Mining and Metals 2012).

Mining in a region is always a challenge in water stressed areas like eMalahleni. The environmental safety problems caused by rising mine water levels were addressed by BHP Billiton in association with Anglo American by establishing the eMalahleni water reclamation plant (EWRP). This system was set up to pump excess mine water from the Kleinkopje Colliery, the Navigation Section of the Landau Colliery, the Greenside Colliery and the South Witbank Colliery to EWRP, where it is treated to potable water standards (Anglo American 2012).

Treated Water Quality

The plant currently purifies 30 m³/day to potable quality. Out of this, 16 m³/day of is chlorinated and provided to the local municipality, providing 20% of the total potable demand (Anglo American website 2014).

The legal document regulating water quality is the South African National Standard (SANS) 241:2011, but water quality requirements also meet the WHO Drinking Water Quality Guidelines and DWAF Aquatic Ecosystem Guidelines. The reclamation plant uses a High Recovery Precipitating Reverse Osmosis (HiPRO) process, from which low salinity product water is generated by a membrane process (Günther and May 2008). To maintain the proper level of water quality, the water reclamation plant is fitted with online instrumentation for constant monitoring. The produced water is also stored batch-wise in reservoirs and quality tested again before it is pumped to the municipal reservoirs. Any water not complying with SANS241 is not added to the municipal water supply and is instead returned to the WRP for re-processing.

Water Management Overview

The main focus of the Anglo American Group-

wide water strategy is water efficiency, security, risk, liability and stakeholder engagement. This strategy addresses the life cycle stages of any operation by applying a group of policies and standards divided into specific focus areas.

To further support the strategy, Anglo American developed site-level water action plans (WAPs). WAPs take local catchment priorities into consideration and help implement the policies and standards of the company in the local context. WAPs are applied to all stages of the mining water cycle and promote efficient water management through avoiding waste, minimising loss, and reusing and recycling water. An intrinsic part of WAPs is the continuous stakeholder engagement within the water management program. By involving stakeholders, the WAPs provide links with other operational plans, including community development, social investment and biodiversity conservation programs.

Current Anglo American targets in water management are related to water use efficiency and further development and implementation of standards and guidelines.

Stakeholder engagement

The first step in the establishment of the eMalahleni Water Reclamation Plant was the identification and engagement of relevant stakeholders at both national and regional levels through a pre-consultation process. During these consultations, local water challenges as well as the possibilities for Anglo American to contribute to solutions were discussed.

Through these consultations, it was concluded that mine water remediation was an unavoidable process to satisfy the sustainability requirements of the Department of Mineral Resources (DMR), the community water security requirements by the Department of Water and Sanitation (DWS) and the requirements of the Department of Environmental Affairs (DEA) for water to replenish the ecological reserve. To satisfy these requirements, the mine water

management practices of several operations were integrated into community drinking water resource management systems even though, in many cases, such level of integration is not required by either the DMR or the DWS. Through this pre-consultation process an integrated regulatory process (IRP) was agreed upon and implemented. The IRP aims to manage approvals for the reclamation project by providing a structured approach to identifying critical activities and any interdependencies between these activities. To implement the IRP, an Authorities Steering Committee (ASC) was formed. The committee, which is chaired by an elected member, supports structural engagement with regulators and serves as a platform for dialogue between stakeholders. Chosen representatives from the DWS, the DEA, the DMR and the eMalahleni local Municipality held discussions within the ASC. Through these discussions the DMR, the DWS and the DEA approvals were obtained with the support of the municipality, community seminars, water usage agencies and other existing forums. Another important aspect of discussion is the enhancement of the public profile of the project through substantial exposure in the local press, which also contributed to obtaining approvals and ensuring a high level of interaction and public participation.

The main concern before starting the process was that the residents of eMalahleni would refuse to use potable water produced from contaminated mine water. In reality, the community welcomed the idea, largely due to their perception of the poor quality and insufficient quantity of water from the municipal water supply. Additionally, a campaign to prove the safety of the use of such water was launched and bottled water from the reclamation plant was distributed through the community for 'taste testing'.

In addition to all of the above measures, the stakeholders established an Operations Liaison Committee for the purpose of evaluating performance against targets and planned produc-

tion. Meetings held by the committee serve as a platform to manage water supply contracts and service-level agreements between stakeholders, and to maintain the policy of open engagement regarding this facility and its on-going supply of water for society.

Lessons Learned

Mining is always a challenge, especially in water stressed regions. Mining activities can negatively affect both water quality and quantity within

communities. The eMalahleni case is an example of how wise water management can provide a common solution to shared concerns by addressing the interests of both the mining industry and the local community. As a result of the strategy, which is supported by combination of policies and standards as well as active monitoring and stakeholder engagement, drinking water supplies in the whole region have been improved.

References

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