



MINE WATER

Compiled by CAMERON MACKAY

Organisation stresses need for long-term AMD solution

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INFRASTRUCTURE IMPACTS


Acid mine drainage with the highest salinity also causes erosion to pipes and similar infrastructure that is maintained by other industrial and economic sectors.

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?6/!'0-7)!3.131' /7!06 (0!06/!,14=0)/. 2! '1,-@ tion of AMD – desalination by means of reverse osmosis or ion exchange – should be implemented by 2015 to address elevated total dissolved solids (TDS) levels. The study found that, if AMD is not treated, the upper Vaal will go into deficit. If there is

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The short-term treatment of AMD was initiated by government in the Western basin in 2012, the Central basin in 2014, and Eastern basin in 2016.

Liefferink describes the short-term solution as a pH adjustment, as AMD has a pH of 2 or 3 and is acidic. AMD contains a range of metals in toxic concentrations, including radioactive metals. This is particularly so in the Witwatersrand goldfields, as the AMD also contains uranium and its radioactive progeny.

“The metals in AMD will precipitate out of solution when the pH is adjusted upwards. The metals have not disappeared, but have changed to a different oxidation state, from a soluble to a solid form. The process can be reversed again, and the metal mobilised, should the water become acidic.”

She states this short-term treatment of AMD will prevent flooding of the Central, Eastern and West Rand basins, as well as uncontrolled decant.

The metal sludge from the

short-term treatment of AMD is disposed of in an openpit, in a shaft, and to a tailings storage facility in the West, East and Central Rand regions.

“There have been many proposed technologies for this disposal, as the metals in the AMD can be reused and can contribute to a circular economy. Instead of the metals becoming a liability, the metals in the sludge can be recovered and sold to help offset the costs for the treatment of AMD.”

The neutralised AMD, however, remains unfit for use, owing to its high salinity of 1 500 mg/l to 3 000 mg/l sulphate.

Liefferink adds that the cost of combating the high salinity is often carried by domestic sectors such as agriculture, and not by the mining sector.

For example, coal mines, in Mpumalanga, discharge water with high salinity and the excess salts seep into the soil used for agriculture in surrounding communities.

Consequently, materials, such

as lime, are required to offset the salinity, with the agriculture sector having to “carry these externalised costs”.

AMD with the highest salinity also causes erosion to pipes and similar infrastructure that is maintained by other industrial and economic sectors.

AMD is associated with surface and groundwater pollution, the degradation of soil quality, harming aquatic sediments and fauna, as well as enabling metals to seep into the environment.

“Long-term exposure to AMD-polluted drinking water may lead to increased rates of cancer and decreased cognitive function, as well as the appearance of skin lesions. It could also affect the neural development of a human foetus,” she explains.

Prerequisites for a Solution

Former Department of Water and Sanitation mine water management director **Bashan Govender** stated in 2021 that continuous pumping of underground mine drainage is a prerequisite for this short-term solution, with 180-million litres pumped a day.

If 150-million litres of neutralised AMD are released into the

Vaal barrage, 60-million litres of clean water would have to be released from the Vaal dam to dilute this salinity.

The Reconciliation Strategy for the Integrated Vaal River System found that the volume in the Vaal dam was insufficient and would have to be augmented by the Tugela Vaal and Lesotho Highlands Water Project Phase II, which might be completed only by 2027 or later.

Liefferink adds that mine water cannot be allowed to flood mine voids and decant, as it will impact on downstream water users. The pumping and treatment of mine water will, therefore, have to continue.

“The National Water and Sanitation Master Plan calls for the reuse of treated AMD to supplement water supply and desalination by 2030. A funding gap of R33.3-billion a year is also anticipated over the next ten years. This gap must be reduced through purposeful interventions, such as policy reviews, enhanced regulation, the implementation of cost efficiency measures and management of user expectations,” she concludes. ■■

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Source: Stephan du Toit

ENVIRONMENTAL CHALLENGES

Acid mine drainage is associated with surface and groundwater pollution, soil quality degradation, harming aquatic sediments and fauna, and enabling metals to seep into the environment