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The WRC operates in terms of the Water Research Act (Act 34 of 1971) and its mandate is to support water research and development as well as the building of a sustainable water research capacity in South Africa.

POLICY BRIEF

Mine-water management

Is there a way to eliminate acid mine drainage on the Witwatersrand?

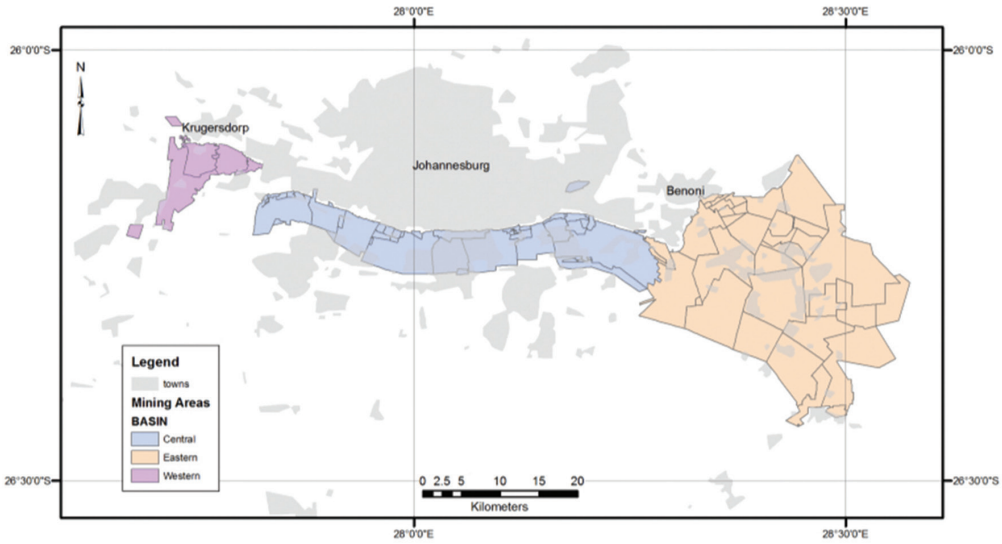
A completed study published by the Water Research Commission (WRC) investigated a conceptual project to use the current Department of Water and Sanitation pumping scheme to eliminate acid mine drainage around the Witwatersrand basin.

Background

Extensive gold mining activity around the Witwatersrand Basin has resulted in the proliferation of acid mine drainage and practical, cost-effective solutions are urgently required to prevent and mitigate damage to freshwater resources and ecosystems. The potential AMD decant is in excess of 200 Ml/day, and contains high levels of sulphate and dissolved toxic chemicals.

The South African government has awarded tenders to various industrial partners to mitigate the problem by pumping the water table down to below environmentally critical levels (ECLs) and treating the resulting effluent using the high density sludge process.

This process is energy intensive and it requires transport of large quantities of lime to and from the treatment site and pumping between tanks and treatment ponds. Pumping and treatment can only, however, be a temporary solution to the problem, as fresh acid mine drainage will continue to be generated in the mine voids for an indefinite length of time and hence will continue to require treatment.



The western, eastern and central basins in relation to Johannesburg.

Objectives of the project

This WRC project proposes a modification to the intended pumping scheme which may potentially reduce the treatment required by altering the depth of the suction line.

It was hypothesised that if we pumped from a lower level, while holding the same ECL, that acid might not be generated following removal of the initial acid present in the void as opposed to pumping from the ECL where acid would continuously be generated. This hypothesis is based on the premise that at depth, oxygen is very limited in water.

This project sought to simulate anaerobic, subsurface conditions with a view to testing the hypothesis. Various experiments were conducted at laboratory scale and the results are presented in the final report.

The way forward

The project illustrated that the pumping requirements are not substantially different to the current set-up proposed if pumps are to be deeply submerged. The research has also indicated that acid is rapidly generated by the rock.

With time, all water quality parameters improve significantly by pumping water from the base of the columns. Additional experiments have shown that this improvement in quality is not a result of pyrite depletion or of flushing of the aquifer as the acid generating reactions are much faster than the residence time of the columns. Recommendations have been made to repeat this experiment in the field.

Further reading:
To order the report, ***Conceptual project on using the pumping scheme to eliminate acid mine drainage*** (**Report No. KV 337/14**) contact Publications at Tel: (012) 330-0340, Email: orders@wrc.org.za or Visit: www.wrc.org.za to download a free copy.