AMD and its adverse impacts

Put simply, acid mine drainage (AMD) is acidic water that forms when water reacts with minerals voided by mining, which are then exposed to air. It is characterised by a low pH (high acidity); high salinity levels; elevated concentrations of sulphate, iron, aluminium and manganese; raised levels of toxic heavy metals; and possibly even radionuclides.

AMD is a major environmental problem relating to mining in many parts of the world, and is responsible for costly environmental and socioeconomic impacts. The acidic water dissolves salts and mobilises metals from mine workings and residue deposits, resulting in a dark, reddish-brown water and pH values as low as 2.5. It is therefore not only associated with surface and groundwater pollution, but is also responsible for the degradation of soil quality and aquatic habitats and for heavy metals seeping into the environment. An exacerbating characteristic of AMD is its persistence - it is extremely difficult to rectify.

AMD in South Africa

In South Africa, AMD occurs in disused and ownerless mines, where historically water was continuously pumped out to keep working areas dry. When mining ceased, so did the pumping, leading to the rising AMD that is now threatening the remaining working mines. Without further pumping the acid water continues to rise and eventually decants at the surface into natural water courses, thus posing significant health, safety and environmental risks.

The problem of AMD is most pressing in the Witwatersrand Goldfields consisting of the western, central and eastern mining basins. These basins have been mined for over 130 years, and some of the mining companies no longer exist. There are underground voids with AMD in an area spanning the heart of Gauteng; hence the AMD legacy issues.

Responding to the AMD challenge

The recent report to the Interministerial Committee (IMC) on AMD presented a comprehensive reappraisal, collating work from other reports and benchmarking the situation and interventions against international practice. The priority focus was on the Witwatersrand Goldfields. The report presents capital budget estimates for both management options (treatment and ingress control), and also includes budget estimates for the monitoring and infrastructure maintenance requirements.

Proposed solutions are not limited to treatment, but also consider the option of ingress control (reducing the rate of flooding and eventual decant of AMD), which to a large extent entails the responsibility of the state and mining industry. This option is responding, in particular, to the challenges of apportioning responsibilities in areas where derelict and ownerless mines exist whose AMD is impacting on mines currently in operation. The treatment option also inherently addresses the pollution threats to the environment and freshwater resources.

The government’s role

Since the problem of AMD is perpetual, the government should take a leading role in dealing with the issue. This would entail enhancing the government’s regulatory function to ensure that current mining activities take responsibility for AMD management within their operations. There is an urgent need to address AMD issues immediately in priority areas, and to intensify monitoring. Interim and long-term solutions have been proposed, and the onus is now on the government to decisively guide the establishment of appropriate institutional structures that include all stakeholders. In his budget speech, the Minister of Finance allocated R225 million to the issue of AMD.

The DBSA’s role

The DBSA’s work in this regard has explored the option of managing AMD by way of treatment to augment industry and domestic water supplies, using private sector involvement. The DBSA has co-financed a private sector bankable feasibility study for the treatment of AMD. The Bank is positioning itself to play a leading role in supporting the government in transaction structuring. Given its earlier collaboration with the private sector, the Bank can help fast-track the implementation of technical solutions and the development of institutional arrangements for allocating risks and funding.

In this process, it will be critical to demonstrate that any AMD transaction is workable and fundable, and can be replicated in other basins.