south african human rights commission

Acid Mine Drainage and Human Rights




The South African Human Rights commission acknowledges MARIETTE LIEFFERINK and EUGENE VILJOEN for providing the photographs that appear in this booklet. Mariette is the CEO of the Federation for a Sustainable Environment and was a member of the SAHRC Section 05 Committee on Human Rights and Acid Mine Drainage. Eugene is one of the Commission's valuable stakeholders who has worked on mining issues in the West Rand, Mogale City, for several years.




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A number of issues define and challenge the South African natural resource base. The mining sector has historically been one of South Africa's main drivers of economic growth, and the country's wealth has been built on an abundance of mineral resources. However, this industry has had a negative impact on the country's water resources. The natural scarcity of water resources in South Africa, coupled with the impact of economic development needs, increased land use, and a growing population, make the impact of mining on the security of water resources a matter of grave concern.

One aspect of the impact of mining on water, that has received attention over the years, is that of Acid Mine Drainage (AMD). AMD is a side effect of mining operations the world over. It occurs through natural runoff after rains flush through a mine dump; from mine companies disposing of the water used in their operations; or from old, disused mine shafts filling up with water, eventually decanting, or flooding, above ground. This water is not clean after running through the mine. Such waters typically pose an additional risk to the environment by the fact that they often contain elevated concentrations of metals (iron, aluminium and manganese, and possibly other heavy metals) and metalloids (of which arsenic is generally of greatest concern). Waters draining active and, in particular, abandoned mines and mine wastes are often net acidic (sometimes extremely so).[1]

In South Africa, AMD has been reported in a number of areas, including the Witwatersrand Gold Fields, Mpumalanga and KwaZulu-Natal Coal Fields, and the O'Kiep Copper District. The Western, Central and Eastern Basins are identified as priority areas requiring immediate action because of, *inter alia*, the urgency of implementing intervention measures before problems become more critical and their proximity to densely populated areas. The situation in other mining regions of the country requires additional information, monitoring and assessments of risk, particularly in vulnerable areas such as the Mpumalanga Coal Fields, where the impact of mining on the freshwater sources in the upper reaches of the Vaal and Olifants River Systems is of serious concern.

[1] Please refer to Annex 1 (on page 27) for more information on the technical aspects of AMD.

The flow of AMD into South Africa's surface and ground water systems is having devastating consequences that are both far-reaching and long-term. Incidents of heavy rains in the country over the last couple of years only seem to be making a dangerous situation even worse. These consequences include degrading the quality of water systems, poisoning of food crops, endangering human health, and the destruction of wildlife and ecosystems, infrastructure, and heritage sites. In industry, contamination from AMD is associated with mining, construction, civil engineering, and quarrying activities. In terms of further ecological implications, AMD is a problem because the vast majority of natural life is designed to live and survive at, or near, a pH of 7 (neutral). The drainage acidifies the local watercourses and so either kills or limits the growth of the river ecology. Effects are even more pronounced on vertebrate life such as fish than on the plant and unicellular life. There is also a human health risk because of the metals contained in the drainage.

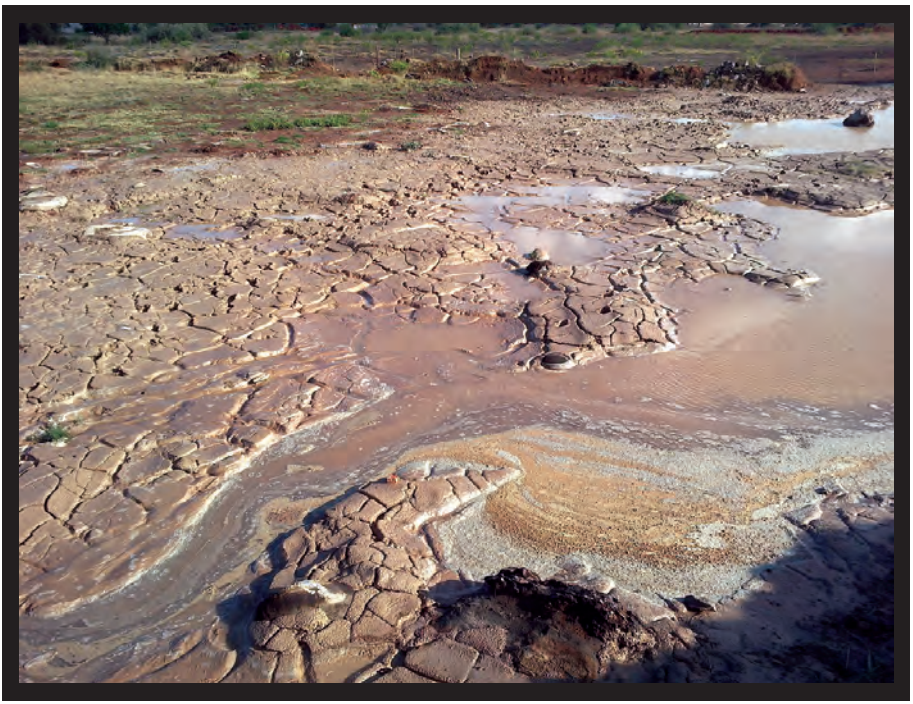

Figure 1: Uraniferous and toxic spillages in the West Rand

2. How does Acid Mine Drainage impact on human rights?

The right to a healthy environment is fundamental to the enjoyment of all human rights and is closely linked with the right to health, well being and dignity. A sound and healthy natural environment lends an enabling context for the enjoyment of other human rights. It is therefore clear that the right to a healthy environment is a fundamental part of the right to life and to human dignity. Adversely, environmental destruction impacts on the State's ability to provide basic socio-economic services to the people of South Africa, and unnatural environmental change is "discriminatory" as there will be a disproportionate impact on socially and economically disadvantaged persons or groups.

There are three main dimensions of the interrelationship between human rights and environmental protection:

- As mentioned above, the environment as a pre-requisite for the enjoyment of human rights (implying that human rights obligations of the State should include the duty to ensure the level of environmental protection necessary to allow the full exercise of protected rights);
- Certain human rights, especially access to information, participation in decision-making, and access to justice in environmental matters, as essential to good environmental decision-making (implying that human rights must be implemented in order to ensure environmental protection); and
- The right to a safe, healthy and ecologically balanced environment as a human right in itself.

The environmental impacts of the mining industry may further undermine the agricultural and industrial sectors. AMD therefore poses a risk to the realisation of the rights to human health services and access to food and sufficient water; the right to housing; the right to freedom and security of the person; the right to human dignity; children's rights; as well as the safety of employees.

Figure 2: The uraniferous Randfontein Robinson dump in 2012

2.1 Who is affected by the development of mines?

The relationship between South Africa, South African communities, and mining is admittedly a complex relationship which has evolved over a substantial period of time. Where the existing vulnerabilities of host communities have not been adequately addressed, adding business, and extractive industries in this instance, to the landscape may in fact exacerbate these vulnerabilities and bring inequalities starkly into focus. Key vulnerabilities exist acutely within host communities affected by mining developments and operations, and located within the surrounding area. Companies need to move beyond compliance-based planning and activities in order to limit the exacerbation of existing vulnerabilities and potential human rights violations.

Figure 3: Informal settlement located on tailings dump

Consultation

Communities need to be assisted in understanding their rights and how to access them. Often times, consultation between stakeholders and communities either does not take place at all, or happens in a way that is not meaningful, leading to a disintegration of trust between all stakeholders. Mining companies need to put plans in place to ensure that affected communities are provided with clarity and certainty with regard to any decisions being made in their areas. Grievance mechanisms should also be in place to enable affected communities to provide comments or lay complaints to mine companies on issues related to the mine's activities and which may be harmful to them in terms of impacting on their rights. In addition, such mechanisms would enable communities to question processes, including those related to the treatment and management of AMD, which would then lend to greater understanding and certainty. A process of complaints handling is essential for communities to have faith in the process knowing that they have a right to recourse.

Business engagement with human rights is an evolving field. One of the most crucial issues at play is the need for not single but multi stakeholder engagements to address alleged and potential future human rights violations at the hands of corporate actors. The former United Nations Special Representative to the Secretary General, John Ruggie, iterates this in the model that he created to broker a way across the impasse, maintaining that: "there is no single silver bullet solution to the institutional misalignment in the business and human rights domain. Instead all social actors – States, businesses, and civil society – must learn to do things differently. But those things must be coherent and become cumulative..."[2]

Therefore, mines ought to make efforts to engage in broader multi-stakeholder engagement, particularly with civil society organisations which they may misguidedly

Figure 4: AMD has serious adverse health consequences for humans and animals

[2] Report of the Special Representative of the Secretary-General on the issue of human rights and transnational corporations and other business enterprises, *Protect, Respect and Remedy: A Framework for Business and Human Rights* (7Apr l 2008, A/HRC/8/5).

place themselves in opposition to, to manage their potential human rights impacts. In considering the human rights implications of the activities of a company, it is also necessary to cast the net wider and consider the cumulative impact of the actions of several companies upon one affected community.

More often than not, the South African Human Rights Commission (SAHRC) finds that effective communication is lacking from all sides, and regular, more effective communication is required from the mines. Furthermore, education and training would greatly assist most stakeholders in understanding all associated issues from a human rights perspective and would generate awareness within communities on what services were available to them from the mine and how to go about accessing these services.

This book attempts to demonstrate how social and environmental issues surrounding the operation of a mine, as is the case with AMD, may lead to human rights violations. Although not conferring broad obligations on the part of the company to promote, protect and respect the human rights of all individuals within its area of operations, the complaints and reports that the SAHRC has received from stakeholders as well as affected community members directed at mines, in this particular case those mines operating in AMD affected areas, should demonstrate the reputational and financial risks of not engaging with potential human rights impacts. In many cases, mitigating human rights risk necessitates an additional layer of analysis as part of any normal risk assessment and mitigation process. Mines should be able to use human rights rhetoric and additional contextual analysis to better understand how social impact issues can evolve into potential human rights violations.

3. How is Acid Mine Drainage treated?

It is generally preferable, although not always pragmatic, to preclude the formation of AMD in the first instance. Such techniques are known collectively as source control measures. Given the practical difficulties entailed in inhibiting the formation of AMD at source, often, the only alternative is to minimise the impact that this polluting water has on receiving streams and rivers, and the wider environment; such an approach involves migration control measures. Quite often, these have been divided into active and passive processes, the former generally (though not exclusively) referring to the continuous application of alkaline materials to neutralise acidic mine waters and precipitate metals, and the latter to the use of natural and

constructed wetland ecosystems. Passive systems have the advantage of requiring relatively little maintenance (and recurring costs) than active systems, although they may be expensive and/or impractical to set up in the first place. In reality, all passive treatment technologies require a certain amount of maintenance costs. The choice of which AMD treatment option to use is dictated by a number of economical and environmental factors.

Active Treatment Technology

The most widespread method used to mitigate acidic effluents is an active treatment process involving addition of a chemical-neutralising agent.[3] Addition of an alkaline material, such as lime, to AMD will raise its pH, accelerate the rate of chemical oxidation of ferrous iron, and cause many of the metals present in solution to precipitate as hydroxides and carbonates. The use of lime to neutralise AMD and precipitate metals is considered, within this booklet, as the standard against which other methods are compared as it has been the automatic treatment choice for many years.[4]

Figure 5: An example of an AMD water treatment plant – active treatment technology

[3] Coulton R, Bullen C, Hallet C. The design and optimization of active mine water treatment plants. Land Contam Reclam 2003;11:273–9.

[4] Further information regarding active AMD treatment technology is offered in Annexure 2.

Passive Treatment Technology

Passive treatment systems by comparison are designed to allow for low, or no, maintenance and should be self-contained with regards to treatment and waste. This category of treatment is generally restricted to the use of wetlands to remediate the AMD. There are many instances of mine water running into naturally occurring wetlands where the water emanating from the wetland is improved with regard to both metal content and acidity. The attraction of the wetland is that the bacteria that occur naturally in the sediments are capable of reducing the sulphate in the acid to hydrogen sulphide which can react with the metals to form the metal sulphide minerals which originally caused the AMD.

Figure 6: An example of a wetland for passive AMD treatment

Recovery of useful minerals from AMD

It is possible to use some of the technologies available to extract and retain valuable metals from the AMD and use these to offset the costs of treatment. In some cases this recovery is the only reason to convert to the technology. Ion exchange and membrane-based separation treatments both offer this option.

In these cases the metals can be taken out of solution and selectively concentrated until they effect a commercial product. Some lime-using processes produce gypsum as a waste product. This gypsum may have a market to which the waste (or product) can be disposed. In South Africa, this option has been researched and investigated by scientific and research institutions, as a way to offset costs.

4. What are mines doing about Acid Mine Drainage?

It is important to distinguish between the century-long AMD problem and the problems posed by the current exacerbation of AMD. AMD is widely perceived as a legacy issue, as it spans South Africa's 120 years of mining, but it is current and future generations that must cope with its effects. The inter-generational nature of AMD permeates the debates over accountability and responsibility for rehabilitation; treatment and remediation. The social, economic and political consequences mean the Government and the mining industry are now taking steps to avert what could become a crisis.

The AMD issue strikes at the very heart of sustainability for the mining sector and how South Africa manages the threat will provide a useful pacesetter on the gap between sustainability rhetoric and reality. In South Africa, the current challenges with AMD can be clearly traced back to over 120 years of mining for gold, coal and other minerals without appropriate environmental safeguards.

There are two main sources of gold mining-related AMD. The first is the estimated 400km^2 of slimes or tailings dumps that can be found around Johannesburg and the second is water filling abandoned, deep-underground shafts, turning acidic, and rapidly approaching the surface as the water table rises. The latter source now represents a far larger challenge – and one for which mining companies historically evaded responsibility by abandoning their operations without putting long-term measures in place to address the problem.

Industry Responses

Current mining operators recognise the critical importance of establishing long-term strategies to mitigate future AMD risks and potential commercial liabilities. One mine, Gold Fields Ltd agrees that waiting for the mines to close before dealing with the risk of AMD has proven disastrous for a number of other South African mining companies. The company has proactively developed what it calls its 'Liquid Gold' strategy to prevent future AMD from its deep underground KDC and South Deep properties, even though KDC has at least a 10 to 20 year window before closure – while South Deep has more than a 50 year window before closure. Its approach involves finding commercially sustainable ways to avoid the manifestation of AMD to begin with.

This will be achieved by providing treated potable and industrial water pumped from closed operations to local municipal, commercial and community users, while supporting AMD avoidance measures, such as ongoing clean and dirty water separation and selective treatment. Through this approach, Gold Fields hopes to avoid what has happened elsewhere in the Eastern, Central and Western basins and minimise residual liabilities surrounding its mines' closure.

In addition, this will simultaneously contribute to improved local water security and foster economic development and diversification in the regions surrounding the two operations. Gold Fields has noted that no earnings from the project will go into its own revenue streams.

Anglo American plc is also combining new technologies, institutional arrangements and commercial partnerships to help minimise future AMD risks from its South African thermal coal business. In 2007 the company established – jointly with BHP Billiton – the eMalahleni Water Reclamation Scheme (EWRS) to treat water from its nearby operations and a disused mine owned by another company in the Witbank coalfields of Mpumalanga province. Anglo American's plant converts mine water into drinking water using a process of reverse osmosis desalination, similar to the technology that is applied in seawater desalination. It currently treats 30Ml/d, which is used both in Anglo's own mining operations and to supply 12% of the nearby conurbation of eMalahleni's growing water needs. The company is expanding the plant to treat 50Ml/day by early 2014 and is considering replicating the project at 10 other thermal-coal operations.

The threat posed by AMD is also providing commercial opportunities for industry service companies. For example, Veolia Water Solutions & Technologies South Africa (VWS SA) and state-owned minerals researcher Mintek announced earlier in 2012 that they were bringing together their independently developed technologies to develop a more effective AMD treatment system. Both the public-private treatment initiative involving VWS SA and Mintek and Anglo's EWRS scheme also look to recover marketable by-products such as gypsum and metal hydroxides from the treatment process, adding further revenue streams that can help fund post-mine closure treatment activities.

5. What is the South African Government doing about Acid Mine Drainage in Gauteng?

AMD is a significant and costly environmental challenge facing the mining industry worldwide. In South Africa, there is a clear need for a better understanding of the methods that can be used to control and limit pollution from the oxidation of sulphidic wastes, and how to select the waste management strategy or strategies most appropriate for a given mine. The lack of knowledge or uncertainty as to the effectiveness of the waste management strategies being used has left mine owners and the State facing significant long term complications. It is a matter of concern if mine sites do not have enough information to know if their wastes are potentially acid generating. This lack of information can leave mine sites exposed to significant financial risk.

The management of potential AMD is unforgiving; it must be done properly the first time. It is a common view amongst experts in the industry that management of known potentially acid generating material is cost effective, but that the rehabilitation of AMD at the end of mine life is expensive.[5] The costs of reducing the release of contaminated drainage to acceptable levels can be high if the management of any potentially acid generating wastes is not incorporated into mine planning.

On the Witwatersrand Goldfields, the Western Basin has been decanting into the Crocodile River catchment since 2002, in the Central Basin, where pumping ceased in 2008, the level of the acid water is rising, with the risk of breaching the Environmental Critical Level (ECL)[6] (and also the tourist level of the Gold Reef City shaft) by

[5] 'Baseline environmental guidelines for new and existing mines', Australian and New Zealand Minerals and Energy Council (ANZMEC) Report 95.02, ANZMEC, March 1995, Canberra, p.56.

[6] The environmental critical level is defined as the highest water level within the mine void where no AMD flows out of the mine workings into the surrounding groundwater or surface water systems.

June 2012. In the Eastern Basin, where pumping stopped in January 2011, it is estimated that the ECL will be breached in June 2013.

Figure 7: An image of the formed AMD dam at the Robinson dump, West Rand, Gauteng

Given the urgency of the AMD challenge in the Witwatersrand, a Directive from the Department of Water Affairs (DWA) was issued to the Trans-Caledon Tunnel Authority (TCTA) to investigate and implement short-term measures to address the AMD challenges in the said area. The AMD decant from the Western basin was identified as a high priority followed by the continuous rising water table, specifically in the Central Basin. Existing information at the time was utilised to formulate the immediate and short-term solutions. The DWA said that the urgency of the problem did not allow for further studies before a solution could be implemented. However, specialist studies are being undertaken as part of the long-term Environmental Impact Assessment (EIA). The existing water quality management programme is designed to prevent excessive salinities in the Vaal River system. The maintenance of the water treatment efforts to maintain the water quality is to be used to limit the impact on the water quality especially for downstream users.

The DWA further says that the time required for the completion of a full EIA process is likely to result in delays in construction of essential infrastructure that is required to prevent the breaching of specific underground water levels i.e. the ECL. If the ECL is breached, there are potential adverse socio-economic and environmental ramifications. The DWA added that the decision to pump and neutralise is based on a detailed assessment that was conducted by the expert panel reporting to the Inter-Ministerial Committee (IMC) on AMD. Subsequent investigations conducted by the TCTA confirmed this decision.

The short-term (4 years) action that was recommended by the AMD IMC is the neutralisation of the acidity, and the removal of heavy metals, but not the removal of salts (desalination). Although the treatment would neutralise the acidity and remove a significant percentage of the heavy metals, the water would still have a high sulphate content which, unless used as make-up water in a closed industrial process, would have no value and would be discharged into the environment. This will then require dilution from expensive and scarce fresh water sources to mitigate the impact.

Neutralisation will reduce the sulphate loads to between 3,000 and 3,700 mg/l (the proposed aeration and gypsum crystallisation in addition to the lime dosing and limestone may, at best, reduce the sulphate levels to 2 000mg/ - the water remains, however, unfit for any usage) and not the regulatory (DWA) limit of 600mg/l. Funds would be needed for both the capital and operating costs (estimated at ZAR 210 million – according to the TCTA's estimation the short term and immediate treatment of AMD will be ZAR 924 million for the capital expenditure [CAPEX], and ZAR 385 million per year for 4 years for the operation and maintenance) and the treated AMD would have a detrimental impact on the receiving watercourses due to the high sulphate content.

However to date:

1) Only ZAR 433 million has been made available for the short-term solution (capital requirement ZAR 924 million);
2) The long-term solution is still subject to a feasibility study even though DWA's own planning directorate shows that treatment of AMD to remove the salt load must be implemented; and

3) The Government still talks of making the "polluter pay" even though it would involve invoking retroactive legislation (legally, it is doubtful this would be possible) and the alternative is an environmental levy on all operating mines in South Africa. The current taxpayer-funded approach was unlikely to be sustainable, particularly in light of the fact that yet more interventions are needed, while the operational costs appeared to be a material factor. However, the suggestion of the imposition of an environmental levy on the mines to pay for the AMD is not convincing. Furthermore, the central concern is how this will be enforced especially for mines that no longer operate.

Meanwhile, the projected costs for dealing with AMD are escalating. In August 2012, the Minister of Water and Environmental Affairs informed Parliament that the projected cost of short-term interventions alone had increased to ZAR 2.2 billion. Likewise, standard forms of AMD management are also becoming more challenging. For example, by 2015 the Vaal river system may not be able to sufficiently dilute increasing volumes of decanting AMD to ensure it is rendered fit for human consumption.

The Government expects companies to deal with AMD at their existing mines. The Government would also like the country's mining companies to contribute financially to wider industry solutions – in addition to those for their own properties. Nonetheless, they have so far only asked a number of firms, where continuous ownership can be traced, to deal with historical damages.

5.1 Delayed Government response

The critical nature of the AMD situation across the Witwatersrand Goldfields has led civil society and local community stakeholders to ask pressing questions:

- ◊ Why had the government waited so long to respond to the problem?
- ◊ Which companies were responsible and how should they be held to account?
- ◊ Who is going to pay to fix the problem and what steps should be taken to ensure costs of future AMD are not imposed on subsequent generations?

The South African Government has been strongly criticised for not responding to the AMD threat early enough, despite civil society organisations, non-governmental organisations (NGOs), and research institutions releasing reports

and statements calling on the Government to take action. These public reports from research institutions, CSOs, NGOs, and other interested and affected parties drew attention to the problem of AMD in the Witwatersrand Goldfields and highlighted the fact that it would only worsen with time, should it not be dealt with. Arguably, it was only once AMD started to threaten the interests of relatively empowered, politically influential and wealthy populations in and around Johannesburg that the Government started to seriously review its options for addressing the issue.

That was in 2010 - almost a whole decade after the first call for action was made. The drainage phenomenon was highlighted in September 2002, when acidic mine water started flowing from an abandoned shaft in the Mogale City/Randfontein area of the Western Basin as a result of the flooding of the mines in this basin to a level where water could flow out onto the surface, and as such the urgency of the situation cannot be argued in defence.

Despite the important and valuable role played by CSOs, NGOs, and other bodies around environmental rights and specifically AMD issues, the Government again failed to meaningfully engage with these bodies, and other members of the public when it came time to make a decision on the preferred treatment option for AMD in the Gauteng province.

The public has a role to play in decisions that affect their life circumstances; and in the matter under consideration, end water users carry the impacts and costs of AMD. Decisions regarding the pumping and treatment of AMD were taken without any public involvement or participation.

In terms of Section 4 of the National Environmental Management Act (107 of 1998):

f. The participation of all interested and affected parties in environmental governance must be promoted, and all people must have the opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effected participation, and participation by vulnerable and disadvantaged persons must be ensured.
g. Decisions must take into account the interests, needs and values of all interested and affected parties, and this includes recognising all forms of knowledge, including traditional and ordinary knowledge.

6. What are the responsibilities of mines in relation to Acid Mine Drainage and human rights?

The responsibility for treating AMD is the crucial issue. As it was not foreseen, when the pumping of mines began, that there would be a problem of AMD, there was nothing set aside to deal with the financial implications. There was also little concern many decades ago about potential environmental problems which might result from industrial activity. Often the companies responsible for the sinking of shafts into the ground are no longer in operation and the problem has not materialised because of the continued pumping by other mine operators in the near vicinity. The question is whether the last operator to stop mining and switch off the pumps should be held responsible for the drainage. It is only then that the problem is noticed though the activity responsible for the drainage will have been carried out by all of the mine operators within the same catchment area.

In the Gauteng context, current mining companies have a legal, moral, and ethical obligation to ensure no run-offs from their mines impact on communities. As such, they rely heavily on legislative instruments to ensure compliance. Therefore, the State ought to ensure enforcement while a body like the Chamber of Mines – with a membership of 60 out of 200 mines – ensures the fulfilment of its own mandate. If the capacity of the State is inadequate, it creates opportunities for mining houses to take advantage. The authorisation-holders have certain responsibilities and their obligations go hand-in-hand with the State's ability to comply. The legacy issue is a problem that must be recognised and given attention. There is no legislation to ensure the legacy problem will not be inherited. The State should accept that the legacy problem is not a mine's alone and should suggest that both parties (the State and the private sector) should invest in water treatment processes as a sustainable solution. It should be a collective solution (of the shareholders and of the State etc.) to the legacy problem. The State is granting licences on the basis of negligence, therefore it is necessary to advise the State that this is unacceptable. Both the State and the private sector ought to collaborate meaningfully otherwise actions will not be sustainable.

With regard to the apportionment of liabilities, the DWA has made it clear that as the regulator they may direct relevant mines to undertake remediation, subject to the recommendations of the legal component of the feasibility study that is currently underway. The DWA will also, in the near future, deal with the smaller mines that are potentially AMD producing mines.

Apportionment studies, performed by the Council for GeoScience (CGS) on behalf of the Department of Mineral Resources (DMR), have found that while a number of the mines in the area are derelict and abandoned, they cannot necessarily be classified as 'ownerless'. Liability for the impacts of these mines, in terms of Section 46 of the Mineral and Petroleum Resources Act (MPRDA), can therefore not be automatically assigned to the State. The apportionment procedure for all basins needs to be verified. Further, an approach to dealing with mining legacies needs to be formulated that will not result in ongoing legal wrangling which could seriously delay the implementation of solutions.

Mining companies may also face civil legal action on account of AMD. This may arise as parties seek to hold companies that are still operating to account either for historical AMD damage or via liabilities they have inherited through the purchase of AMD-affected land.

As mentioned, apportioning liability has hitherto proven very difficult due to the long history of mining and the related complexity of establishing closed mines' previous ownership (and with it proving a clear chain of liability for AMD). Previous legal challenges against mining companies have largely been unsuccessful, but this trend may not continue as the legally entrenched Polluter Pays Principle is fast becoming a reality.

In July 2012, the North Gauteng High Court ruled that Harmony Gold must continue paying for water to be pumped out of a West Rand mine it sold in 2008. The company is to appeal the decision. Nonetheless, if the verdict is upheld, an important precedent will be set in terms of landowner obligations. Likewise, a legal assessment of the mining industry's liability is being undertaken as part of the DWA's feasibility study into potential long-term solutions to AMD.

Although difficult to measure, AMD may harm the reputation of individual companies operating within the jurisdiction as well as that of the industry as a whole. Such reputational harm may have the potential to inhibit the ability of companies with AMD-affected operations in South Africa to enter new geographies and constructively engage with local communities, or to access and raise finance.

Indirectly, reputational harm may feed into wider debates over the role of mining companies in South Africa, ultimately providing ammunition to those

arguing for significant sector restructuring, including an expanded state role in the mining sector – although this could also see the state having to assume more of these liabilities.

7. What is the SAHRC doing about AMD?

Established under Chapter 9 of the Constitution of the Republic of South Africa Act, 108 of 1996, (the Constitution) the South African Human Rights Commission (SAHRC) is a national institution established to entrench constitutional democracy through the promotion and protection of human rights. As such the SAHRC is mandated to:

- ◊ Promote respect for human rights and a culture of human rights;
- ◊ Promote the protection, development and attainment of human rights; and
- ◊ Monitor and assess the observance of human rights in South Africa.

The Constitution also sets out the powers attributed to the SAHRC necessary for it to undertake its function including the powers to:

- ◊ Investigate and to report on the observance of human rights;
- ◊ Take steps to secure appropriate redress where human rights have been violated;
- ◊ Carry out research; and
- ◊ Educate.

The Human Rights Commission Act, 54 of 1994, confers further powers, duties and functions on the SAHRC. These include the power to conduct an investigation into any alleged violation of human rights, to call any person to appear before it and produce to it all articles and documents required in terms of the investigation. Chapter 2 of the Constitution contains the Bill of Rights which "enshrines the rights of all people in our country and affirms the democratic values of human dignity, equality and freedom."[7]

Over the last couple of years, civil society organisations, non-governmental organisations, and other affected stakeholders have approached the SAHRC to draw attention to the environmental degradation brought about by AMD, and the impact this mining problem has had not only on the environment, but also on the human rights of host and surrounding communities.

[7] Section 7(1).

Figure 8: An image of AMD crust formation on natural vegetation

Within its legislative mandate, the Commission has the power to establish expert-advisory committees that have a particular focal point. The first subsection of Section 5 of the Human Rights Commission Act No. 54 of 1994 stipulates that the Commission may establish one or more committees consisting of one or more members of the Commission, and one or more other persons, if any, whom the Commission may appoint for that purpose and for the period determined by it. With the Commission's focus on the right to a safe and clean environment and the designation of a dedicated Commissioner to deal specifically with natural resource management and human rights, the Commission is well-placed to carry out a number of activities in promoting and protecting the right to an environment that is not harmful to health or well-being. The purpose of such a Committee is to advise the Commission as a NHRI, established in terms of the Paris Principles, on possible roles and activities that could be undertaken in terms of its constitutional mandate to promote and monitor access to the above right.

Section Five Committee – Human Rights and Acid Mine Drainage: The Commission established its first expert-advisory Section 5 Committee in 2011. The first meeting was held on 22 March 2011 and the 2nd meeting was held on 13 September 2011. From these meetings three sub-committees emerged, drawn from the committee members, namely economic actors; advocacy and awareness, and government liaison. Each of these sub-committees have held teleconferences; and the economic actors sub-committee also had a meeting with the National Business Initiative (NBI), mining companies, and the Chamber of Mines on how to bring the private sector onboard and how to engage with the Government on the issue of AMD. The Commission also wrote to the Department of Health (DoH) in 2011 to request that signage be erected around mines, especially those affected by AMD, to make people aware of the dangers of occupying land in that vicinity and the impact of the affected environment on children who play in the area.

The Commission was invited to visit the West Rand goldfields on 15 August 2011 by the CEO of the Federation for a Sustainable Environment (FSE), Mariette Liefferink. The purpose of the visit was to investigate the environmental impacts of various mining and re-mining activities in the greater Krugersdorp area, and the subsequent effects on surrounding communities.

National Workshop: AMD Treatment Options and Human Rights. At the end of 2011, it was decided that a workshop would be hosted by the Commission to engage the Government on the preferred AMD treatment option for the short-term solution i.e. neutralisation, as well as the plans for a long-term treatment plan for AMD. The successful workshop was held in March 2012. Following the workshop, it was decided that the Section 5 Committee would be dissolved as the Commission felt that its work was complete; nonetheless, the Commission continued to work and engage on the issue. The Commission was subsequently invited to sit on a study stakeholder committee for the long-term feasibility study (LTS SSC) on AMD convened by Aurecon, Department of Water Affairs, and SRK Consulting. The Commission has since attended three meetings of the LTS SSC on AMD, and has convened a high-level meeting with the Director General of DWA to bring the rights-based concerns of AMD to his attention, and to get clarity on a number of issues relating to the decisions made by the Government on AMD remediation.

7.1 Challenges going forward

AMD has increased scrutiny of the practices of mining companies with operations in South Africa and could hold significant regulatory, legal, closure liability, and reputational implications for the industry.

Elements of the regulatory framework relating to mining are likely to be amended at ensuring the industry meets some of the costs of managing the AMD legacy across the country – and to ensure that the environmental impacts of future operations are minimised. For example, an environmental levy may be introduced on current operational mines, with proceeds used to fund the whole of the industry's environmental legacy, including AMD.

AMD management interventions could also be funded through the enforcement of existing legislation, such as the National Water Act – and its associated raw-water tariffs and fines for environmental non-compliance.

In response to the significant financial burden imposed on the South African Government in relation to potential AMD-related liabilities and derelict and ownerless (D&O) mines, an August 2012 report by environmental NGO WWF-SA called for "a review of the way financial provisions are estimated, the instruments used for securing provisions and the financial reporting of environmental risks and closure liabilities". Fiscal remedies, however, are likely to be highly unpopular with the industry at a time when the South African Government is also – controversially and notoriously – looking to increase its revenues from, and ownership in, the country's mining industry more broadly. Nonetheless, the need for a levy to be put in place for rehabilitation on mine closure, at the very onset of a mine's operations, is clear. In the USA abandoned mines are rehabilitated under the National Abandoned Mine Land Programme under the Office of Surface Mining Reclamation and Enforcement (OSMRE) of the US Department of the Interior. Funds are raised via a levy on active coal mines and deposited into the Abandoned Mine Lands (AML) fund — a trust administered by the U.S. Treasury[8] to pay for reclamation of mines abandoned before the passage of the Surface Mining Control and Reclamation Act of 1977.[9]

[8] Office of Surface Mining (2006) "Surface Mining Law." From http://www.osmre.gov.

[9] Wikipedia (2007) "Surface Mining Control and Reclamation Act of 1977." From http://en.wikipedia.org.

The AMD situation may also provide the social impetus for more onerous controls for the sector as whole. Greater state resources may also be deployed towards enforcement activities, including discharge limits and water-use licences.

With environmental and regulatory pressures converging, the next year is a critical one for the mining sector in South Africa. If the industry and the Government are able to deal collaboratively with the legacy challenges of AMD in the Witwatersrand, as well as establish how future AMD risks will be jointly managed, then a strong signal will be provided to society and outside investors that the gap between sustainability rhetoric and reality is closing.

Meanwhile, if industry-developed AMD treatment solutions prove effective, there will be potential for these technologies to be rolled out internationally, thereby creating commercial opportunity and seeing South Africa take an international leadership role in what is likely to emerge as an increasingly divisive conservation issue.

ANNEXURE 1

Acid Mine Drainage (AMD) is a natural consequence of mining activity where the excavation of mineral deposits (metal bearing or coal), below the natural groundwater level, exposes sulphur containing compounds to oxygen and water. The environmental problem occurs because, when the pumping stops, the groundwater begins to flood the mine, slowly approaching the original groundwater level. As the water rises it eventually reaches the level of the mine/decant void and begins to drain once again, sometimes over one hundred years after it last did so.

In brief, the major cause is the accelerated oxidation of iron pyrite and other sulphidic minerals resulting from the exposure of these minerals to both oxygen and water, as a consequence of the mining and processing of metal ores and coals. Many metals occur chiefly as sulphide ores and these tend to be associated with pyrite, which is the most abundant sulphide mineral on the planet. Likewise, coal deposits contain variable (generally 1–20%) amounts of pyritic-sulphur as well as organic sulphur. AMD may form in underground workings (groundwaters) of deep mines (particularly gold mines, but also coalfields), although this is generally of minor importance when a mine is in active production and water tables are kept artificially low by pumping. However, when mines are closed and abandoned, and the pumps turned off, the rebound of the water table can lead to contaminated groundwater being discharged. AMD originating from abandoned mines to date has carried no, or extremely limited, liability and so has had to be funded from the public purse.

Due to the more disaggregated (and more concentrated, in the case of tailings) nature of the acid-generating minerals in these waste materials, AMD that flows from them may be more aggressive than that which discharges from the mine itself. Another important consideration here is the potential long-term pollution problem, as production of AMD may continue for many years after mines are closed and tailing dams are decommissioned. Although the generic term AMD (or acid rock drainage) is used frequently to describe mine water discharges, the pH of these waters may be above 6, particularly at the point of discharge (where dissolved oxygen concentrations are frequently very low). If the water is not treated then it will cause severe damage to the environment, both visually and to wildlife. If the water is treated then there are other problems that have to be addressed. Money will have to be spent, subsequently, either on maintaining the water level below the discharge level, or disposing of the metal-rich sludges remaining after treatment.

ANNEXURE 2

Active Treatment Technology

Lime treatment is simple and robust, and the benefits and drawbacks of the treatment well known due to long usage. It does, however, present several environmental problems. The material produced after treatment with the lime, a high-density sludge (HDS), is metal rich and usually contains a significant amount of water. The HDS may also contain various other metals, depending on the chemistry of the mine water treated.

The metals mean that it will often require special waste disposal facilities which add to the costs of disposal. The water content increases the volume and weight of the waste which means that money is being spent to dispose of water which might otherwise be avoided. The general methods to reduce the water content are often labour or energy intensive which also increase costs and are often unable to keep up with the flow of material from the treatment system. The requirement for lime also has direct environmental consequences for the regions where the limestone is quarried.

Passive Treatment Technology

The nature of AMD is that it persists for long periods of time, often requiring constant low level treatment. The maintenance of equipment is often more expensive than the reagents used for treatment. The main problems with the wetlands solution are the time it may take for a natural system to react to the, sometimes extreme, changes in water flow and the fact that whilst the water flows all year round the bacteria are most active when the weather is warm. There is also an engineering problem: getting the water to contact, most efficiently, the anaerobic (oxygen-free) parts of the wetland where the remedial process is most efficient.

There have been several modifications to the original wetland solution, with each adding more and more active elements to the passive solution. It is now recognised that there is unlikely to be a completely passive system, but there are hopes that a low maintenance solution may be found.

Recovery of useful minerals from AMD

It is possible to use some of the technologies available to extract and retain valuable metals from the AMD. With the use of these technologies it is also possible that a potable water supply may be produced, though this is likely to be more expensive than the revenue such a product would generate. A more likely option is the production of 'grey' water which may have industrial uses.

Most of the ion exchange and membrane based technologies will also require some pH modification, usually in the form of adding lime. This is a far lesser use of lime however as only small amounts are required to modify the drainage to neutral as opposed to the amounts required to make the solution alkaline enough to precipitate metals as in standard lime treatment scenarios.

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