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ENVIRONMENTAL LEGISLATION AND WATER MANAGEMENT ISSUES DURING MINE CLOSURE IN SOUTH AFRICA

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ABSTRACT

Mining has been the mainstay of the South African economy for more than a century, and will continue to play this key role for the foreseeable future. Mining currently operates in a rapidly restructuring political, economic and legislative climate which can affect the viability of operations.

Driven by many factors, the mining sector continues to seek innovative ways to improve environmental performance, both during operations, and at closure. Reflecting the increased awareness of and value attached to the environment by society, mining operations must address historical environmental damage, give effect to the Constitutional right to an environment which is not harmful to health and which is protected, and contribute to the sustainable development of the country.

Closure is a situation facing more South African mines than ever before, not least due to the slump in mineral prices, the cost of capital in South Africa, and the floundering global and local economies. The legislative and policy framework within which closure must be achieved is one which is currently under intensive review. A closure certificate can only be granted in terms of the Minerals Act 50 of 1991; the requirements of other Acts must be met "in perpetuity". This apparent conflict between the "walk away" situation allowed by the Minerals Act, and the ongoing need to address requirements of other Acts creates legislative, administrative and practical barriers to effectively achieving an acceptable closure situation. Water is a critical aspect to be addressed when closure is sought; the legislative requirement that the water resource not be made "less fit for use" sometimes defies practical expression.

In the first section of the paper, the legislative framework within which closure must be achieved in South Africa will be presented. The second section of the paper will include practical examples of problems encountered, with specific reference to water. Innovative solutions currently being explored will also be highlighted, including:

- *"design for closure" tailings guidelines;*
- *treatment options;*
- *the use of risk assessment to satisfy legislative requirements; and*
- *possible transfer of post-closure obligations to third party entities.*

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INTRODUCTION

The mining industry in South Africa has, for many years, contributed significantly to the development of the country, and continues to play this role today. Mining contributed significantly to South Africa's export earnings in 1998, and contributed more than 7% to the country's total GDP. South Africa's mineral wealth includes gold, coal, platinum and various base metals; translation of this mineral wealth into financial and human capital is a vital role that the mining industry plays in South Africa as a developing country.

Mining impacts on the environment significantly, not least of which impacts relate to surface- and ground-water. Acid mine drainage, waste management, air pollution and ecological impacts rate high on the priority list of any mining environmental management programme.

The regulatory and policy framework within which the mining industry operates is in a rapid state of flux. One of the effects of this rapid change is the uncertainty it brings, in terms of obligations to be met, timeframes involved and meeting the needs of various stakeholders, including government.

With respect to closure, these needs include:

- those of the State, which aim to minimize exposure to long-term risk;
- those of the mine owners, who aim to minimize expenditure and achieve a walk-away situation;
- those of labour, who aim to prevent closure in the interest of preserving jobs, and
- those of communities, who aim to preserve a viable society.

South African mines are thus faced with the daunting task of ensuring that these needs are married in a cost-effective, environmentally sustainable and administratively efficient manner.

THE HISTORY OF MINING ENVIRONMENTAL LEGISLATION IN SOUTH AFRICA

The Mines and Works Act entailed limited environmental protection measures, namely the filling in of subsided areas, prohibiting the release of water containing "injurious matter", and requiring soil cladding of dumps to prevent pollution. Water thus featured in the earliest protective legislation in the country. The Chamber of Mines, in the absence of adequate legislation, and in the interests of assisting mine owners to discharge their environmental responsibilities, developed a set of environmental protection guidelines for their members. Consequently, these guidelines gave rise to amendments to the Mines and Works Act, requiring a rehabilitation programme and restoration of the surface, but for opencast mines only.

With the global focus changing to prevention and management of impacts, rather than "clean up", the Minerals Act 50 of 1991 took into account integrated environmental management practices, by requiring all new and existing prospecting and mining operations to prepare and submit an environmental management programme report (EMPR), to obtain authorization for the operation. An *Aide-Memoire* was prepared to assist and guide mine owners in the preparation of these reports. The EMPR consists of an environmental impact assessment (EIA) and an environmental management programme (EMP), in which *inter alia*, baseline pre-mining conditions, the mine plan, impacts and management measures, and financial provision details are provided to the Department of Minerals and Energy (DME). It is incumbent on the DME to consult with all relevant government departments on the adequacy of the EMPR, including the Departments of Water Affairs and Forestry (DWAF), Environmental Affairs and Tourism (DEAT) and Agriculture (DoA). The Minerals Act requires that any changes in the mining operation have to be approved via amendments to the EMPR. To date, over 9 000 EMPRs have been submitted to the DME for approval. Closure objectives are integral to the EMPR, as is financial provision, whereby, under the Minerals Act, mine owners are obliged to make available adequate financial provision during the life of a mine for implementation of impact management measures as described in Section 6 of the EMPR, the EMP which is the only legally binding section of the report.

The South African mining industry was thus the first sector to be formally regulated in terms of environmental requirements, in the country.

RECENT DEVELOPMENTS IN MINING ENVIRONMENTAL LEGISLATION AND POLICY

Minerals Policy

The White Paper on a Mining and Minerals Policy was published in October 1998. Chapter 4 of the policy gives effect to the Constitutional right to environmental protection within the context of mining. The policy explicitly recognizes the need to maintain rehabilitation measures where mining activity has ceased. The policy also recognizes that is essential for the utilization of mineral resources within the country to be undertaken within a framework of responsible environmental management.

Section 4.1c of the policy calls for the prevention or efficient management of water, soil and atmospheric pollution. The policy requires that "closure be granted only after satisfying that there are no foreseeable future residual impacts that will be inherited by parties acquiring such land". One aspect of the policy which may give rise to conflict in terms of closure is the recognition of the Department of Water Affairs and Forestry as the lead agent for the national water resource, parallel with DME's role as the lead agent for mining regulation. Of most significance to closure is section 4.4 (viii) which requires the application of "cradle-to-grave management of environmental impacts in all phases of a mine's life, effective monitoring and

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auditing procedures, financial guarantees for total environmental rehabilitation responsibilities, controlled decommissioning and closure procedures, procedures for the determination of possible latent environmental risks after mine closure and the retention of responsibility by a mine until and exonerating certificate is granted".

Minerals and Mining Bill

In order to give effect to the new Minerals Policy, and take account of other legislative changes, the Minerals Act of 1991 is to be replaced in 2000 by a new Minerals and Mining Act, currently a Bill under development. It is anticipated that various aspects currently creating deadlock at closure will be addressed in this Act.

ENVIRONMENTAL LEGISLATION

Environmental legislation in South Africa has been, and remains, highly fragmented. Some of the most significant laws (and attendant regulations) pertaining to environmental management include:

- Environment Conservation Act (which includes provisions for waste management).
- The Atmospheric Pollution Prevention Act.
- National Water Act No. 36 of 1998.
- National Environmental Management Act 107 of 1998.

In total, there remain more than 89 pieces of legislation dealing with environmental aspects in South Africa. Various policy development processes are also relevant to the discussion. The Consultative National Environmental Policy Process (CONNEP) resulted in a framework for cooperative governance regarding environmental issues, which was widely supported by the mining sector, and which culminated in a Policy on Environmental Management for South Africa. Subsequent to that has been the Integrated Pollution Control and Waste Management policy, and most recently the development of the National Waste Management Strategy. As is evident then, the environmental governance framework remains fragmented and widely dispersed across government departments.

SO WHAT IS THE PROBLEM WITH CLOSURE?

Section 38 of the Minerals Act imposes full responsibility for rehabilitation on the holder of a prospecting permit or mining authorization. In terms of Section 12 of the Minerals Act, closure is achieved once a certificate has been issued by the DME, exonerating the mine from its obligations in terms of the Act, when the obligations and commitments set out in the EMPR have been met. The closure certificate warrants that the holder has met all environmental, health and safety obligations, under the Minerals Act and Regulations. It does not however, exclude liability under other legislation or the common law. Thus the issue of a closure certificate is not a defence to an action for damages at common law based on delict or nuisance, or certain statutory provisions under other Acts.

The problems associated with closure can be attributed to the fact that the State is reluctant to assume responsibility for environmental management flowing from a mine workings until it can be assured that the risk associated with the impact is minimized, and appropriate and sufficient provision of security is made to cater for such future events.

At issue is thus the uncertainty surrounding post-closure impacts which may be realised. The post-closure phase entails activities undertaken after the issuing of a closure certificate, generally by a party other than the original holder of the mining authorisation, who has legally accepted responsibility for the mining area, as well as any impacts arising from the area. A third party may be the State, a new land owner or any other party assigned responsibility for managing the area.

It is within this situation that the holder of a mining authorisation wants to achieve a "walk-away" situation, whereby he/she is discharged of all responsibilities arising from the site. Financial provision is critical in this aspect (refer to appropriate financial provision section).

The National Water Act 36 of 1998

The National Water Act deals primarily with pollution prevention, particularly where pollution of a water resource may occur as a result of activities on land. The person who owns, controls or occupies or uses the land is responsible for taking measures to prevent resource pollution. These measures include measure to:

- cease, modify or control any act or process causing the pollution;
- comply with any prescribed waste standard or management practice;
- contain or prevent the movement of pollutants;
- eliminate any source of pollution;
- remedy the effects of pollution; and
- remedy the effects of any disturbance to the bed and banks of a water course.

If such measures are not taken by the responsible person, costs may be recovered by the relevant authority from one or any combination of the following parties:

- any person who is or was responsible for, or who directly or indirectly contributed to the pollution or the potential for pollution;
- the owner of the land at the time when the pollution or the potential for the pollution occurred, or that owner's successor in title;
- the person in control of the land or any person who had the right to use the land at the time when the activity or the process is or was performed or undertaken or the situation came about;
- any person who negligently failed to prevent the activity or the process being performed or undertaken or the situation for coming about.

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The Act also allows that, for a controlled activity (in which various activities relating to mining are included), the waste treatment, pollution control and monitoring equipment to be installed, maintained and operated may be specified together with the management practices to be followed to prevent the pollution of any water resource.

Relating to financial provision, security may be required in respect of any obligation or potential obligation where it is necessary for the protection of a water resource or property. Such security may include a letter of credit from a bank, a surety or bank guarantee, a bond, an insurance policy or any other appropriate form of security. This security may extend beyond the time period specified in any license in question.

Thus, in terms of the Water Act 36 of 1998, the requirements for water management are extensive.

There are inherent conflicts in the provisions of Section 12 of the Minerals Act, and sections of other legislation regarding environmental management, especially the Water Act.

In order to satisfy the requirements of all legislation, so as to achieve a complete cessation of legal responsibilities after decommissioning and rehabilitation, the following route is advocated. Planning for closure needs to be incorporated into the mine life cycle at the earliest possible opportunity, preferably in the feasibility study stage. Early planning regarding closure will ensure that environmental management options are explored and exploited to the maximum, and that options do not become restricted due to irreversible actions and the results of decisions.

This is the premise which is guiding many developments regarding closure in South Africa today (which developments are discussed in detail under the following sections). Bringing closure planning to the fore at the start of operations is seen as the best option for precluding non-achievement of closure objectives, drawn-out negotiations with regulatory departments at the time of closure, and ensuring clear and unambiguous targets. This approach is the most appropriate to gauge, understand and coalesce all stakeholder needs with those of the mine owner to achieve legal obligations.

POSSIBLE SOLUTIONS

Some of the solutions to the problems surrounding closure are focused on achieving the above objective of including mine closure planning up-front in mine development. These approaches can be divided into two main categories, namely regulatory, and management approaches.

REGULATORY

Mining Environmental Management Series of Guidelines

The *Aide-Memoire* has been in use for nearly 7 years, and in this period, a number of shortcomings have been identified with the process. In the intervening years, mining policy and legislation, as well as environmental management policy and legislation has changed markedly. In order to address these shortcomings, and bring the EMPR system into line with the revised policies, a revision of the *Aide-Memoire* is being prepared. In the process of revising this guideline, it was recognized by the DME that broader guidance was needed for mining environmental management in the industry, and to address the needs of other stakeholders. Thus, the Department is undertaking the preparation of what is to be termed the Mining Environmental Management (MEM) Series of guidelines, which is illustrated in Table 1.

In order to instill the understanding that closure planning is required to be included at the outset of projects, the revised *Aide-Memoire*, which guides proponents on the process needed to obtain mining authorization via an EIA and EMP, also requires detail on initial closure plans for the mine, including rehabilitation and financial provision for the same.

Of critical importance to the South African mining industry are the closure guidelines, which will be released simultaneously with the revised *Aide-Memoire*. These guidelines will outline both the process to be followed to obtain closure, and the content of reports, audits and final plans required.

Environmental Management Performance Assessment and Monitoring Regulations

These regulations, coming into force at the end of June 1999, require a "systematic, periodic, objective and documented evaluation of the compliance with the EMP approved under Section 39 of the Minerals Act and the continued appropriateness and adequacy of the approved EMP". Section 5.18.12 of these regulations requires a final performance assessment, which must be used to determine if all legislative requirements have been met, if the objectives of the EMP have been met, and the risks associated with these have been quantified, with appropriate management thereof having been arranged.

This process will assist closure in two ways. Regular, life of mine review of the EMP and impacts will allow problems to be identified early, and objectives to be changed to account for these problems. This permits the identification and exploitation of a greater range of options. Good data gathering and manage-

First Tier Guidance	Framework for Mining Environmental Management		
Second Tier Guidance	Revised Aide-Memoire	Operational Guidelines	Closure Guideline
Third Tier Guidance	Technical guidance on various topics, including Best Practice Guidelines for Water Management in Mining		

Table 1. The Mining Environmental Management Series of Guidelines, as proposed by the Department of Minerals and Energy, South Africa.

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ment should also assist in impact prediction, and provide supporting evidence for the appropriateness and effectiveness of management measures. This should make the final negotiations with regulatory authorities at the cessation of operations easier, due to the availability of valid information, and substantial record base. It is important to note that closure will not be granted until a final EMP performance assessment has been undertaken.

The Committee for Environmental Coordination

The National Environmental Management Act (NEMA), promulgated on 29 January 1999, provides for cooperative governance via the Committee for Environmental Coordination (CEC). This is critical to the achievement of a walk-away closure situation for the following reason. The DME has been, and remains the lead agent for all aspects of mining regulation, including environmental management. NEMA defines DEAT as the lead agent for environmental management, but permits delegation of responsibilities. Thus DME will retain the lead agent role for mining environmental management but, via the CEC, will be able to liaise effectively with other government departments with respect to environmental issues, including those surrounding closure. This formalization of the liaison with various departments may help to reduce the administrative fragmentation which currently delays permitting processes, and may help to resolve conflicting departmental requirements.

The CEC should also assist by streamlining administrative requirements at closure. The purpose of the CEC is to "promote the integration and coordination of environmental functions by the relevant organs of the state...". Given that one of the functions of the CEC is to establish mechanisms to "provide a single point for the receipt of applications for authorizations, licenses and similar permissions...where such licenses are required by more than one organ of state", the conflicts arising between the various departments due to the limitation of the closure certificate to the Minerals Act, should be afforded some consideration and hopefully resolution via this body.

MANAGEMENT APPROACHES

Risk Assessment

Whilst the government is willing to assume responsibility for closed mining operations under circumstances where the owners cannot be traced, they are somewhat reluctant to do so when owners are present and trying to obtain a closure certificate. The state needs to be assured that their liability in assuming responsibility for the mine will be minimal, and will not cause undue financial burden.

As such, the move now is towards undertaking a risk assessment prior to closure being granted, in order to determine the hazard and risks associated with latent and residual impacts. The main technical stumbling blocks to achieving closure are how to address historical problems, confidence in predicting long-term impacts and financing for post-closure management. It is imperative that efforts be focused on minimizing real risks, not perceived or non-significant risks. Once an initial screening risk assessment has been done to identify the significant issues, a qualitative assessment of major risks should follow. A cost-effective management plan can then be developed and implemented to address these major risks.

Critical to this discussion however, is that currently, the regulatory authorities cannot provide a clear indication of what level of risk they would be willing to accept, nor are they able to provide guidance on what would constitute an acceptable methodology of arriving at risk based conclusions. Such lack of certainty contributes to the delays and uncertainties surrounding closure.

Codes of Practice

Two Codes of Practice (COP) for Mine Residue Deposits are soon to be effected in South Africa. The one is the South African Bureau of Standards (SABS) COP and the other, the Mine Health and Safety COP.

Recent technological advances and public pressure arising from particularly, the Merriespruit disaster resulted in the development of the SABS COP. The Department of Minerals and Energy commissioned the South African Bureau of Standards to develop a COP, which is now complete, and is referred to as SABS 0286. With the implementation of the Mine Health and Safety Act, regulations and guidelines are being developed to further the implementation of the Act, amongst which is the COP for Guidelines for Mine Residue Deposits.

The SABS Code of Practice (COP) for Mine Residue Deposits is a comprehensive approach which addresses the entire life-cycle of *inter alia* tailings dams, especially in terms of safety impacts, environmental concerns, construction and management. The COP contains fundamental objectives, principles and minimum requirements for good practice, aimed at ensuring that no unavoidable risks, problems and/or legacies are left to future generations.

The objectives of the SABS Code include safety to life, limb and property, environmental responsibility, effectiveness and efficiency. The principles in the Code include continual management throughout the life cycle, minimization of impacts and risk, the precautionary approach to promote prevention, internalized costs and cradle-to-grave control.

The Code contains a safety and environmental classification, which determine the minimum requirements for investigations, design, construction, operation and decommissioning of the residue deposit, and also specify tasks and minimum qualifications. The higher the safety risk, and/or the more significant the potential environmental impacts associated with the residue deposit, the more stringent the requirements specified in the COP. Hazard is the key concept on which the safety classification is based, and is defined as "the potential to cause harm as a consequence of failure". Each deposit is thus classified as being a high, medium or low safety hazard. The depo-

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sits are also classified according to the spatial extent, duration and intensity of potential impacts, and are labeled as a significant or not significant impact.

Of relevance to this discussion are the objectives and principles associated with the final phase of residue operation, namely Phase 5: Decommissioning and Aftercare, during which

- the health and safety of humans, ecological environment and integrity of property and infrastructure must be safeguarded
- final land use capability must be achieved
- procedural and substantive needs of all interested and affected parties must be addressed, and
- adverse existing and residual impacts must be minimized.

Similarly, the Mine Health and Safety COP addresses the life-cycle of a residue deposit, but focuses on health and safety hazards, and not on environmental concerns. The Mine Health and Safety COP serves as an umbrella guideline, in which the SABS COP, and the existing Chamber of Mines guidelines are referenced.

Financial Provision

Financial provision should be viewed as good risk management, rather than as an onerous burden. Financial provision can be a tool to enable transfer of risk and liability, thereby minimizing the long term financial risks of all role-players, whilst providing the security needed. In terms of Regulation 5.16 under the Minerals Act, all mines shall demonstrate in the EMPR that they have the financial means and have made sufficient and acceptable pecuniary provision to the satisfaction of the Director: Mineral Development to carry out such a programme. The Minerals Policy also reflects that the mining entrepreneur will be responsible for all costs pertaining to the impact of the operation on the environment. In addition to this, a Policy concerning financial provision for the rehabilitation of land disturbed by mining activities was issues as a directive by the DME in January of 1995.

The objectives of the Policy Concerning Financial Provision for the Rehabilitation of Land Disturbed by Mining Activities are:

- to clarify the responsibility of the mining industry with regard to the provision of funds for the rehabilitation of land disturbed by prospecting and mining operations;
- to assist the Director: Mineral Development of the Department of Minerals and Energy and other affected government departments in satisfying themselves as to whether the holders of prospecting permits and/or mining authorizations can make the necessary financial provision for the execution of an approved EMP; and
- to identify the ways and means by which such financial provision may be made.

The policy essentially sets out the process in which the applicant or holder of a prospecting permit or mining authorization demonstrates its ability to meet its obligations pertaining to the execution of its EMP, and ensures that funds are available to the Director: Mineral Development when stipulated obligations cannot or will not be met. The principles laid down include that:

- the quantum of the provision shall be based on the requirements stipulated in the approved EMP;
- ongoing rehabilitation costs must be provided for in working costs during the life of a mine as set out in the approved EMP;
- the obligation to make provision applies from the date of approval of the EMP to the date of issue of the closure certificate and the initial quantum of provision is to be calculated in consultation with all affected government departments and is to be revised on a regular basis; and
- the funds are safe from seizure in case of liquidation of the holder of the prospecting permit or mining authorization.

The sufficiency of financial provision made will therefore clearly depend on the adequacy of the EMP. That neither is treated in practice as dynamic, hints at one of the major obstacles to final closure.

The methods of funding approved by the policy are:

- dedicated trust fund;
- dedicated bank account registered in the name of the operator;
- bank guarantee; and
- any other arrangement approved by the Director General of DME.

Over the years, trust funds have become the preferred option due primarily to their flexibility and potential tax benefits.

The policy is fairly controversial in terms of its acceptance of responsibility or co-responsibility for environmental management after the issuing of a closure certificate, on behalf of the State. The fact that the Department of Water Affairs and Forestry is not a signatory to the closure certificate together with the wide ambit of liability potentially imposed in terms of section 19 of the National Water Act, makes it debatable whether a closure certificate can ever be considered to be unconditional.

Under the Income Tax Act, if a mining company establishes an Environmental Trust Fund approved by the Commissioner on Inland Revenue, whatever amounts are placed into that fund for the purposes of discharging environmental obligations are tax deductible. At the same time, the income arising from the fund is exempt from tax (via a special dispensation). These funds can however, only be used for discharging the environmental obligations imposed by law. Any funds which remain once all obligations have been discharged are not refundable to the mine.

Although a regulatory requirement, financial provision essentially is a management tool to provide for environmental rehabilitation, especially at closure. This ties in closely with risk assessment; as the excess funds are irredeemable, mines

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need to ensure accurate judgement of risks and associated obligations. The blanket approach to financial provision is that the total liability at any one time, divided by the life of mine allows an estimate of funds needed to be provided per year. This has to be a steady provision and cannot be increased in good years, or decreased in poor years of return.

CONCLUSION

The key success factors in achieving a walk-away situation at closure therefore include the following:

- Early attention to closure in the life of mine, preferably at the planning and feasibility stage.
- Assessing and incorporating stakeholder needs in closure plans
- Development, review and updating of closure plans within the framework of the EMPR, and any other environmental management system.
- Concurrent rehabilitation.
- Ongoing monitoring and gathering of data to achieve validated environmental information.
- Regular negotiations with the relevant regulatory authorities, making maximum use of conflict resolution mechanisms, and regulatory mechanisms such as the CEC.

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