Environmental considerations in the preparation of bankable feasibility documents

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Introduction

There is an increasing awareness of the importance of including an assessment of environmental liabilities in the preparation of bankable feasibility documents. This means that environmental assessments of proposed, existing and decommissioned mine sites have to be undertaken for the purposes of quantifying environmental liabilities and assessing potential risks. This paper examines the need for considering environmental liabilities before describing the approach adopted in undertaking due diligence studies for the preparation of bankable feasibility documents and some of the difficulties experienced. Finally, some concluding remarks are made and the implications for the mining industry are discussed.

The need to consider environmental liabilities

Environmental responsibility, whether enforced by statute, public pressure or company policy has become a necessary component of mine management in general. It is now, more than ever before, an issue to be considered in business planning. This is because environmental costs are reaching levels that are becoming material or potentially material to the financial assessment of mining operations. Experience gained in due diligence studies undertaken by SRK Consulting has shown that there are considerable discrepancies between mine estimates of environmental liability and their own cost estimates. The latter are based on an assessment of needs carried out during the due diligence exercise. In general terms the mine's estimate is frequently a closure cost estimate compiled for the purposes of determining annual contributions to a rehabilitation or closure trust fund. While this estimate may be comprehensive it is generally characterized by:

- The exclusion of cost estimates, not related to closure, for capital expenditure required for upgraded environmental management during the remaining operational life of the mine, as opposed to mine closure
- In some cases, inadequate operational costs to cover additional monitoring, on-going rehabilitation and maintenance
- A focus on demolition, rehabilitation and related issues. The associated costs are generally easily quantified
- A lack of attention to many less easily quantified costs.

The result of this is that environmental management costs, as reflected in the closure cost estimate, generally underestimate the total life of mine environmental management cost. There is therefore a need to establish this latter cost for inclusion in an independent financial analysis to be included in the bankable study.

The nature of the assessment and the approach adopted

Sound environmental management depends on input from a number of specialist disciplines. While environmental science has become a recognized discipline in its own right, technical solutions to environmental problems remain the domain of engineers and scientists in the fields, amongst others, of:

- Rehabilitation technology
- Hydrogeology
- Surface water management
- Water treatment technology
- Radiation protection
- Civil engineering.

This results in the need for a multidisciplinary approach to each assessment. A complicating factor is the fact that there are generally very significant constraints on the time available to undertake the assessment and on the availability of data. There is therefore a need for co-ordination of what could be a large team of specialists to ensure that:

- Appropriate attention is paid to each anticipated environmental issue, with due regard to the potential cost implication
- A consistent approach is adopted for each mine included.

In all of the due diligence work undertaken by SRK Consulting one of the most significant findings with respect to the nature of the environmental component of the assessment is that:

- There is frequently a high level of uncertainty with respect to actual costs that will be incurred
- The highest level of uncertainty is frequently associated with the highest potential cost.

Particular examples of high cost issues associated with very high levels of uncertainty are long-term water quality control, particularly with respect to ground water in the post mining scenario, and radiation (where applicable). For both of these issues long-term requirements can be determined in

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terms of current standards but cost-effective methods of achieving these standards, and in some cases the standards themselves, may be the subject of some debate.

Against this background the assessment is based on information obtained from site visits and reports made available, particularly the Environmental Management Programme Reports (EMPRs) or, where relevant, Environmental Impact Assessments (EIAs). These are supplemented by interviews held with relevant staff on the mines or at corporate head office. While the EMPRs or EIAs provide a framework for the assessment of impacts it has been found, at least in the South African context, that compliance with an EMPR does not necessarily imply adequate attention to issues with significant cost implications. Where available, specialist studies frequently provide a more meaningful basis for cost assessments. In many instances, even the specialist studies are found to be conceptual in nature, describing the problems but not proposing definitive solutions. In such cases reliance has to be placed on the professional judgement of specialists in the due diligence team. This is a direct result of a lack of adequate information.

Once the site visit has been undertaken and relevant data collected the adequacy of the mine's financial provision is assessed and an independent cost estimate is undertaken with respect to issues that are either omitted from the mine's estimate or found to be inadequately addressed. This results in a total life-of-mine environmental cost estimate included in the financial analysis as a cash flow based on the projected life-of-mine plan.

In all of the studies undertaken to date there have been significant issues for which the lack of definitive costing has resulted in the need to make decisions regarding actual costs in areas of uncertainty. In general, an attempt is made to ensure that these decisions are as objective as possible. In practice, objectivity is sometimes only achieved as a result of the careful consideration of a number of relatively subjective views of a number of relevant specialists. This extends to the point where anticipated costs for many uncertain impacts are identified as risks, and described as such, but are not included in the financial analysis for valuation purposes. Environmental risks may, however, be included in sensitivity analyses.

Difficulties experienced

Difficulties encountered in the quantification of liabilities include uncertainty with respect to long-term impacts, frequent limited availability of data and the changing legal and regulatory framework.

Uncertainty with respect to long-term impacts

Early legislation related to environmental management in the mining industry focused on:

- The containment of polluted water
- Dust control
- The sealing of shafts in the closure scenario
- Backfilling of dangerous excavations
- Rehabilitation of disturbed areas.

The containment of polluted water and dust control are initially financed as capital projects with on-going maintenance covered by operating costs. The other issues listed are required for closure and as such have been addressed since the 1980s in closure cost estimates. This has progressed to the point where most mines have a closure cost estimate, updated on an annual basis and used for the computation of annual contributions to trust funds to provide for final closure. The individual costs are easily computed, and in fact many mines now include in their closure cost estimates actual quotations for demolition of infrastructure. Similarly, rehabilitation costs are based on actual contracts, with on-going rehabilitation during the remaining operational life being common. Volumes to be backfilled are easily computed and standard civil engineering rates can be applied. The same applies to the sealing of shafts.

The ability to quantify these costs facilitates their inclusion in mine closure costs which are:

- Easy to substantiate
- Generally within a closure cost range which has become accepted as reasonable.

By contrast, however, issues which have become prominent in more recent legislation are not fully addressed in either the mines on-going environmental management costs or closure costs.

In the early 1990s there was a move away from prescriptive standards to self regulation in environmental management in the mining industry. This was reflected in the implementation of the concept of EMPRs in terms of which:

- Performance criteria, such as water quality objectives, had to be specified
- Residual impacts had to be described, preferably in quantitative terms.

In practice, performance criteria frequently remain qualitative in nature and many residual impacts are poorly understood.

The uncertainty associated with the situation described above leads to a need to make assumptions with respect to long-term impacts, based on available information, for the purposes of determining and costing remedial measures. These assumptions are often based, of necessity, on such vague information that definitive conclusions cannot be drawn.

Limited availability of data

While most South African mines have environmental monitoring programmes in place a lack of data for many key issues is frequently encountered. Such data could include detailed water balance information, specific water quality information and hydrogeological data. This lack of appropriate data weakens the basis for assumptions that have to be made. There are two major areas where this is the case, namely:

- Actual technical information on relative impacts
- Information on potential solutions, with particular emphasis on cost effectiveness.

Changing legal and regulatory framework

Environmental legislation in South Africa is changing, particularly with respect to water management. Since the life-of-mine has to be considered, a view has to be taken of the legal

and regulatory framework that will exist throughout the life of the mine. While this can be done in terms of draft legislation and policy statements a degree of uncertainty remains and to some extent assessments, therefore, include a degree of speculation, not only with respect to actual legislation but also the manner in which it will be implemented. The latter is frequently seen as having relevance to the economic environment in which the legislation will be enforced. A particular example is the potential requirement for active water treatment, which has far-reaching financial implications and may be imposed in the operational and post-mining scenarios. Until fairly recently the economic justification for water treatment was questioned to the extent that it was excluded from cost assessments even in the absence of more cost-effective alternatives. In such cases it was merely described as a risk, as discussed above. This means, by implication, the adoption of a view that instead of remediation which is perceived to be expensive, standards would be relaxed as a result of economic considerations. Increasingly stringent water quality objectives have resulted in water treatment being seen as a real possibility in most recent due diligence assessments. This stance is reinforced by the tacit acceptance by a number of mines that active water treatment options have to be considered.

A similar situation exists with respect to radiation for which:

- Current legislation suggests that there are tracts of land affected by mining that will never be approved for unconditional land release in terms of radiation protection requirements
- Technical requirements to obtain unconditional release involve costs which give rise to questions regarding cost effectiveness
- The alternative is long-term statutory control, for which costing remains uncertain.

These examples indicate that potential solutions and their implementation are not sufficiently well understood to allow definitive cost estimates.

Materiality

The concept of materiality is an important aspect. In essence an issue can be regarded as material to the investigation if it potentially affects the viability of the operation. Clearly defined materiality tests in terms of financial or other considerations can be formulated. The use of these tests is, however, complicated by:

- Frequent uncertainty with respect to actual costs that are likely to be incurred
- Potential unforeseen consequences of certain impacts, such as successful civil claims against the mine
- Materiality as a result of factors which may not be easily measurable, such as impacts on the reputation of the company.

This results in decisions regarding materiality sometimes being somewhat subjective and dependent on the reason for the due diligence. If the study involves a valuation of assets all identified costs will be considered but a subjective assessment of materiality will be used to determine the level of effort involved in refining cost estimates. Available cost estimates for less material issues may be accepted without further refinements while considerable effort may be required in the refinement of cost estimates for issues with more significant implications. A frequent complication, as noted above, is the inherent uncertainty associated with the more material issues.

If the study does not involve a valuation but merely the identification of material risks a rigorous materiality test may be required. This is most likely to be linked to financial considerations with the following provisos:

- A fixed material cost threshold may not be suitable for all operations included in an assessment due to differences in the sizes of the operations
- Certain issues may not be material for individual operations but could be material to the group when evaluated on a cumulative basis.

However it is applied, the notion of materiality is an important consideration in determining the composition of due diligence teams and the level of effort spent on individual issues.

International context

The comments in this paper are based on studies undertaken in South Africa. It is worth noting that the South African environmental policies are developing and that this situation differentiates this country from countries where the relevant legislation has developed to a point where requirements are fully prescribed and can, therefore, be addressed in terms of proven engineering solutions. This could result in costs not even contemplated in South Africa. Many of the philosophies inherent in international standards are likely to find application in the South African context as a result of financing requirements and the policies of global companies operating in South Africa.

Whether or not international standards are enforced will, to a large measure, dictate philosophies applied in the environmental component of due diligence studies.

Conclusions

While a number of due diligence studies have been undertaken in South Africa and the associated environmental management costs calculated, a substantial element of speculation with respect to actual liabilities remains. This can be dealt with in a number of ways, including:

- The adoption of the view that socio-economic pressures will result in some relaxation of otherwise idealistic environmental standards, probably influenced by international trends
- The adoption of a worst case scenario in which it is assumed that idealistic standards will apply
- A compromise, in which it is assumed that a pragmatic view will be taken, with cost effectiveness of environmental measures being carefully assessed with due regard to considerations such as national interest. In this situation certain environmental issues identified as risks may develop into real liabilities while others may not materialize.

Whatever the view taken, a due diligence exercise can not be regarded as providing an accurate estimate of costs that will ultimately be incurred. It is, however, a means of assessing individual operations on an equitable basis.

Implications for the mining industry

It is impossible to discuss implications for the mining industry in terms of prescriptive rules regarding what should be included or excluded from environmental due diligence assessments. Known costs can be incorporated with relative ease. Worst case costs, which will be acceptable in an international or idealistic context, can be assumed. The actual situation is considerably more difficult to predict. Implications are that:

- Mines need to devote more effort to assessing real impacts
- Practical solutions need to be found, with adequate measures of cost effectiveness
- A risk-based approach is essential for due diligence studies which allows investors to assess potential liabilities.

Against this background environmental studies used to assess the feasibility of projects remain comparative reviews as opposed to definitive cost estimates. Strategic planning will depend on improvements in the level of confidence that can be placed in the assessments. Risk analysis techniques are available as a means of quantifying financial risk. The reduction of this risk, however, depends on more comprehensive technical investigations than are currently available for real quantification of impacts and potential solutions. ◆