

Resources and Reserves — Their Impact on Financial Reporting, Valuations and the Expectations Gap

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ABSTRACT

Resources and reserves are critical inputs into the determination of an operating mine's financial results and balance sheets, but how well understood is this fact. Do the investors, directors, accountants and geologists/engineers responsible for preparing or relying on relevant aspects of the end results properly understand the inputs and outputs and the associated risks that may be established.

The first step is to understand how financial reports are impacted. The most obvious, and best known, impact is in the calculation of depreciation and amortisation charges against long term assets. In addition, however, there is a requirement to regularly determine whether asset book values are impaired – this is nearly always performed globally by the preparation of a discounted cashflow model for a mine which is usually based on a mine life as determined from the resource and reserve statement – the particular driver here is normally the short and long term production plans. A key aspect of the short term production plan is that it would normally not assume that the reserve and resource statement implies consistent grade, stripping ratios, etc. However, outside of the early years of a plan, more generic assumptions of these variables are often made in conjunction with the reserve and resource statement. Depending on the timeframe of the detailed production plans, this can have a large impact on a project's net present value. Other financial balances that may also be impacted include restoration and rehabilitation provisions, retraining provisions and deferred or equalisation stripping accounts.

The age old question of whether all reserves should be used or whether some or all of the resources should be included for financial reporting purposes has never been adequately resolved. It is our view that there should be no prescriptive answer to this question but judgement of all professionals involved in the process needs to be included. Furthermore, the company needs to be able to support their conclusions with well thought out and appropriate answers. This may not be in line with the approach that certain accounting standard setters may be proposing or taking, and this paper will outline the current status of global requirement and the likely future directions.

Whether reserves or resources are utilised, does not change the key requirement that those preparing or using reserve and resource statements need to understand key aspects. For example:

- geologists/engineers – do they know how reserves or resources will be used?
 - have they imparted information on variability of key drivers such as grade or depth or dilution?
 - do they know that major financial/business altering decisions may be made based on the analysis?
- accountants – do they understand where the numbers have been derived from and the assumptions that may have been made in their determination?
 - do they understand the degree of accuracy (or inaccuracy) that may exist particularly with resources)?
 - do they understand the history of resource reconciliations and what it may mean for the future?
- directors – do they understand the processes undertaken by the company to prepare the financial report and the interaction between

the geologists/engineers and accountants?

- do they understand the potential sensitivity of results to the input variables?

Financial reporting is extremely reliant on the use of the reserves and resources, however, the geologists/engineers, accountants and directors do not always understand the interactions between themselves which may lead to misleading public reporting.

More education and communication between various parties is needed.

INTRODUCTION

Resources and reserves[†] are critical to the determination of mining companies financial results, but this is not always well understood. Investors, analysts, directors, accountants and geologists/engineers responsible for preparing or relying on valuations, profit and loss accounts and balance sheets do not always understand the importance of the resource and reserve estimates (together with the associated risks that are inherent in their measurement). There is potential risk of profit misstatement arising from their misuse in the preparation of financial information.

This paper is split into three sections. Firstly, consideration will be given to how a mining company should be measured, and for those measures considered reliable, the impact of reserves and resources on those measurement techniques. Following this, detailed consideration will be given to the impact of reserves and resources in relation to profitability with particular emphasis on two areas, being impairment and depreciation. Finally, valuation and other pertinent issues are discussed.

MEASUREMENT OF PERFORMANCE OF A MINING COMPANY

There are different perceptions of how mining companies should be measured, and with each passing year, audited financial results (interchangeably used in this paper with the term profitability) seem to carry less weight. This is short sighted, albeit that the audited financial results do have limitations, primarily being their derivation from historical asset values (stemming from the date assets were established or acquired) rather than an asset's current valuation.

Prior to focussing on profitability as the method of measurement of a mining company's performance, it is relevant to consider some of the other measures that are used to determine performance in this sector. Whilst not an exhaustive list, other performance measures include:

- exploration success,
- production,
- cash costs, and
- share price valuation.

Exploration success

Measuring a company's performance by exploration success is highly appropriate for junior companies. Typically, the management and the directors of these exploration companies are very close to the action and have a good feel for what is occurring in the company. Similarly, investors in such companies are looking for capital growth through exploration success, not dividends from stable earnings.

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† The terms resources and reserves are used generically as meaning mineralisation likely to be economic and mineralisation that is shown to be economic respectively, unless the reference is to a specific resource or reserve, where the JORC defined terms Mineral Resource and Ore Reserve are used.

The major material that these companies will be reporting will be geological information, hopefully including reserves and resources. The importance of the reserves and resources as an input to the reported information is likely to be greater than the audited financial results.

It is rare that sensitivities or the statement of the major assumptions in determining reserves and resources are included in reporting by junior companies.

Exploration success is certainly an important performance measure for all mining companies, however, its relevance as a measure depends on the exploration information being reported. In general the larger the mining company, the less material that exploration reporting becomes.

Production

The release of production statistics is an extremely useful barometer as to how a mining company is performing. The old dig and deliver mentality of mining companies, where production was more important than profitability, is however hopefully a thing of the past. Most companies would now agree that there is no point in mining product for the sake of it, and thus as a performance measure of a mining company production has extreme limitations.

Note that focussing on production rather than profitability, increases the risk that value will be destroyed.

Cash costs

Cash cost comparisons are commonly used by many in the industry, and many industry observers, such as analysts. Being in the lowest quartile of cash cost producers is an aim that seems to be shared by the vast majority of mining companies around the globe. This fixation on cash costs within the mining industry has been damaging, and has been one of the primary reasons behind the industry continuing to destroy value year after year. There is far too much focus on making a cash return, whilst ignoring the sunk costs incurred by shareholders in establishing operations.

Whilst management aim to reduce cash costs, they may not be aiming to create value for shareholders. For example, you can reduce cash costs by making an over priced acquisition of a very low cost project. This may have great benefit in reducing the average cash cost but may destroy significant shareholder value. There has been significant consolidation in the global mining sector over the last two years, and we may well see that some such acquisitions will fall into this category – this will be seen through impairments of carrying values in future years.

The subject of cash costs and their relevance is a significant subject in its own right, and therefore will not be debated in this paper. There is undoubtedly a time and place for cash cost reporting, however, it is a dangerous measure if used in isolation.

Share price valuation

Judging performance of a company by looking at the share price value takes all of the above performance measures into account (including the draw backs of each!) as well as the profitability of a company. It also takes into account issues such as commodity price outlook and movements in prices, exchange rates and perceptions of companies and industries. In many ways, it is the ultimate measure as to whether shareholders are satisfied with the manner in which management and the directors are steering the company. Clearly, market values can also include a number of potential factors that may be outside the control of the company, and they may not reflect a perfect valuation of a company on a day to day basis. In essence, short-term trends may underlie long-term true value.

This method of measurement of performance takes into account reported exploration information and profitability, and thus, relies on reserves and resources being accurate.

MEASURING A MINING COMPANY'S PERFORMANCE

As with many things in life, looking at one individual measure is not appropriate, and to a large degree, stakeholders in the mining sector should look at a number of the potential performance measures set out above as well as profitability. The most relevant of these (depending on the size of the company) are exploration success, profitability and share price valuation – all of which are open to being inappropriately considered if reserves and resources are not properly reported. The next section of this paper focusses on the reporting of profits. This is, as mentioned earlier, the most widely accepted means of judging performance by the investment community, and takes into account sunken costs invested in projects, and therefore reflects whether management and the board actually make adequate returns from the assets under their stewardship.

Profitability

Reporting of profits for half year and full year is expected around the world. These are normally presented in audited financial results. Whilst there may be some drawbacks to the fact that audited financial information is based on historic costs rather than current values, there is no better tried and tested method for measuring a company's business success. The profitability of a company is also easy to benchmark across other industries and across the world.

Whilst bankers and analysts have often suggested that audited financial results lack relevance, they do provide a line in the sand which remains the most globally accepted method of reporting. We will look at the calculation of profits in this paper, and as previously stated, reserves and resources are crucial in the determination of profits, and that importance is not always clearly understood.

It is important to realise that the mining industry is not guaranteed to receive market investment. The industry will only receive investment to the extent that potential shareholders have comfort that they will be likely to receive additional 'created value' by investing in the mining sector compared with other industries. The importance of comparability of results across industries is therefore essential, which leads to profit remaining a particularly relevant measure of how a mining company is performing.

The larger the company becomes, the more important the profitability measure becomes. Certainly the major mining houses are carefully scrutinised on their actual profit results. This is highly appropriate as it ensures that management and the board justify how they have utilised shareholder equity, through capital decisions. Profit provides an indication as to whether value has been created or destroyed by the organisation.

Profit's main limitation is its lack of alignment to current valuations. This is best explained by a simple example: two companies purchase 50 per cent of a project, company A acquires its share for \$100, whilst company B purchases its shares ten years later for \$200. The life of the project was 20 years when company A acquired its share, and is ten years when company B acquired its stake. For the first year of ownership of company B, the project makes a return of \$40; for simplicity, assume no depreciation in this year (although it has been charged for the prior ten years, based on life of project). Reported returns are calculated in Table 1.

If instead, the financial accounts recognised all assets at their current value (assume \$200 for both company A and company B), the return on equity will be the same for both companies.

This limitation in the current reporting of profits is significant. The obvious method to address this potential issue is to value all assets and liabilities at their fair value (which would in effect bring the reserves and resources onto the balance sheet). This is not as easy as it sounds. Perhaps the easiest reason to understand

TABLE 1

	Company A	Company B
Investment	100	200
Depreciation (company A has ten years, company B has zero)	(50)	-
Net book value	50	200
Return (\$40 evenly split)	20	20
Return on equity	40 %	10 %

why this method is not used is that it depends on many assumptions in determining the fair value – most readers will realise the inconsistency that could occur if each mining company had to determine a fair value for each mine. Assumptions such as future prospectivity, commodity prices, exchange rates etc would need to be selected, and it can be imagined how some entrepreneurs may gild the lily when it suited them.

In looking at profit reporting, it is important to understand that there is also a need to look at the balance sheet. Accounting principles require both statements to be prepared before any confidence can be gained on the accuracy of either. Both these statements utilise historical cost accounting. Tables 2 and 3 follow a typical example of a profit and loss account and balance sheet for a mining company.

TABLE 2

Typical example of a profit and loss account for a mining company.

Sales	X
Less:	
Cash costs of production	(X)
Depreciation/amortisation	(X)
Profit before once off items and tax	X
Impairments	(X)
Tax	(X)
Profit attributable to shareholders	X

TABLE 3

Typical example of a balance sheet for a mining company.

Assets:	
Cash and debtors	X
Inventory	X
Net book value of fixed assets	
- plant and equipment	X
- mine development	X
	X
Liabilities	
Creditors and debt	X
Rehabilitation provision	X
Net Assets	X
Equity	
Shareholder equity	X
Profits attributable to shareholders	X
	X

The balances within the profit and loss account and balance sheet that require large degrees of judgement in determining their value have been highlighted, all of the other items are determinable by expected cash inflows and outflows. When each of these judgement areas is considered, there is one overriding factor that highlights itself in the judgement determination, and that is the importance of the accuracy of the reserves and resources.

Depreciation/amortisation expense – typically, for a mining company, this is determined over reported Ore Reserves (and sometimes Mineral Resources) - see below for further discussion on this subject.

Impairments – refer below, but generally determined by net present value calculations which are highly dependent on Ore Reserves and Mineral Resources

Inventory – stated at the lower of cost and net realisable value. Cost is determined from cash costs and depreciation/amortisation, and thus, Ore Reserves and Mineral Resources are relevant. Net realisable value is determined based on mineral content at an assumed price, less costs to complete. Thus, geological information in relation to the mineral content is also of relevance.

Net book value of fixed assets – this is original cost less depreciation/amortisation which is dependent on Ore Reserves and Mineral Resources. In addition, impairment issues (that also impact net book values) are also dependent on Ore Reserves and Mineral Resources.

Rehabilitation provisions – cost of closure are increasingly reflected at the current value of the future cost, which is impacted by Ore Reserves and Mineral Resources (as they determine the life of the operation). In some countries, a gradual provision is raised, usually over the life of an operation, based on Ore Reserves and Mineral Resources.

The purpose of this analysis is to reflect the importance of reserves and resources in financial statements, and in particular, that their accuracy is vital when considering the profit or loss of a mining company. In essence, if Ore Reserves and Mineral Resources are misstated they can misrepresent the profit and loss account and balance sheet.

The question that this begs is whether the people responsible for preparing Ore Reserve and Mineral Resource Statements understand that they may well be the most important determinant of a company's profits. Experience suggests that there are major expectation gaps:

- The competent person/s who signs off an Ore Reserve and Mineral Resource statement often has no idea that the information will subsequently be utilised by accountants, directors, auditors and investors. Worse still, they do not realise that they may be responsible for the most important determinant in a company's profit, share price determination, or hedging strategy.
- Furthermore, accountants, directors, auditors and investors, often consider Ore Reserves and Mineral Resources to be fact rather than an estimate.
- The operational team will prepare a life-of-mine forecast based on geological information. Whilst there is often a high degree of communication between geologists and operational teams, this is not always the case. Where this does not occur, inappropriate assumptions may be made by the operational team.
- The accountant preparing the financial statements doesn't always understand some of the key assumptions that may have been made in determining resources and reserves. From experience, there is many an occasion when the accountant has treated the Ore Reserve and Mineral Resource statement as a fact, and not considered the possible upside and downside sensitivities.

- Auditors do not always place sufficient emphasis on the method of determination of the Ore Reserves and Mineral Resources, or understand the underlying assumptions. (I hasten to state that this is a general statement that does not apply to all auditors!)
- Ultimately, the directors take responsibility for financial statements when they pass a resolution to approve them. As reserves and resources may be the most important determinant in the financial statements, the directors are in effect taking responsibility for the accuracy of the Ore Reserve and Mineral Resource Statement.

The above discussion has required the assumption that the importance of reserves and resources in the accounting measurement is easily understood. This is not the case. To illustrate this, focus is turned to the two accounting judgement areas that are particularly reliant on reserves and resources, being impairment and depreciation/amortisation.

IMPAIRMENT

In Australia, an accounting standard requires all non-current assets to be reviewed for impairment. This requirement is set out in AASB 1010 'Recoverable Amount of Non-Current Assets', and is as follows: 'A non-current asset must be written down to its recoverable amount when its carrying amount is greater than its recoverable amount.'

Whilst this is an Australian Accounting Standard, it should be noted that there are similar requirements in major accounting standards throughout the world.

In the mining industry, the recoverable amount is nearly always determined by the calculation of a net present value.

The net present value calculation typically utilises a life-of-mine plan, which has usually been prepared at mine sites and includes assumptions such as costs, capital expenditures, mining methods, etc. This plan will be based on, or will dovetail into, the Ore Reserve and Mineral Resource Statement prepared by the competent person/s. These life-of-mine plans do not always obtain a sign off from the competent person/s to ensure that their reserve and resource information has been utilised appropriately.

The other factor that needs to be taken into account is that the majority of life-of-mine plans do not take into account the assumptions made in scheduling reserves and resources. Typically, the first year or two will utilise varying grades of product, strip ratios, dilutions etc. However, normally by year three (if not before) a longer term plan is utilised, that uses average grades and recoveries. This practice can cause very misleading results, particularly where items such as significant capital expenditures may be required to access future reserves and resources. If the Ore Reserve and Mineral Resource Statement is not properly understood, the amount of capital expenditure required to access reserves or resources may be ignored or misstated in the life-of-mine plan.

In an impairment calculation, there are many pieces of crucial information. The most important will be the Ore Reserve and Mineral Resource Statement, followed by the cost information, mining methods/assumptions made by the operations team, commodity price and exchange rate assumptions (often obtained from economists or the financial team).

The accountant is tasked with putting all of this information together and performing a meaningful analysis. The accountant does not always understand all of the key assumptions that have been made by each of the relevant individuals having input in the provision of information. Without such knowledge, it is impossible to perform appropriate sensitivity tests. Sensitivities are regularly performed on prices and exchange rates, however, rarely are sensitivities performed on the accuracy of reserves or resources. Normally the reserves and resources are taken as

factual, rather than as estimates. Whilst this often makes little or no difference, there is a risk in not having a thorough understanding. The concern is that this risk is not understood by many of the relevant stakeholders in impairment decisions.

When net present value is less than book value, or only marginally exceeds book value, the likelihood of an impairment write down increases. In these instances a really clear and accurate understanding of the reliability of the Ore Reserve and Mineral Resource Statement is of great importance.

DEPRECIATION

Depreciation (and indeed amortisation) is the charge against the fixed asset carrying values performed to write the asset down to its residual value at the end of its useful life. In a mining business there is no more logical method of determining this charge than basing it on reserves and resources. The exception to this is where delineated reserves and resources suggest a mine life that is so long that questions over technological developments or other potential advancements lead to a capped life being assumed, at say 25 years. This highlights the importance of reserves and resources in the determination of depreciation charges for almost every mining company.

All of the above concerns regarding expectation gaps in relation to preparers of technical or accounting information and users of financial reports such as analysts, investors, shareholders etc are equally relevant in the determination of depreciation charges as they are with impairments.

In all accounting literature, there is no specific comment as to whether Ore Reserves should be the basis for which the depreciation charge is determined, or whether Mineral Resources may also be included, or indeed, other mineralisation. Recent commentary from the Securities and Exchange Commission in the US suggests that they are moving towards Ore Reserves only. Current practice includes:

BHP Billiton	- Ore Reserves
Anglo American	- Ore Reserves
Rio Tinto	- Not clear, although the term 'economic life' suggests ore reserves are used
WMC	- Ore Reserves
MIM	- Ore Reserves
Placer Dome	- Ore Reserves
Newcrest	- Unclear
Anaconda Nickel	- Unclear

This all suggests that the larger mining companies are utilising Ore Reserves for their depreciation calculations. Whilst it can be understood from the perspective of conservatism why Ore Reserves should be used, the concept is not one with which I agree. In general, I am against prescriptive rules that take away professional judgements, and believe that whilst a default starting point should be to base depreciation purely on Ore Reserves, the mining company should have the ability to also utilise some resources provided they have used appropriate professional judgement, and are able to justify their decision (and if material, disclose their reasons).

VALUATION AND OTHER PERTINENT ISSUES

- Just as outlined in the last section on Depreciation, the SEC and now ASIC are tending toward only allowing the inclusion of Ore Reserves in valuations. Again, this is a prescriptive view and does not result in improving the communication of business potential to the market. A far better starting point is to allow for professional judgement on what should be included in a valuation, in recognition that

this judgement will be scrutinised and needs to be justifiable. It should also be noted that in a recent case the SEC has also questioned the validity of the calculation of probable reserves.

- The point in time where value is most easily destroyed by a mining company is when a development decision is taken. Typically a board of directors will sanction projects based on the information provided to them. As with impairment, it is usual that a net present value calculation will be presented that is based on Ore Reserves and Mineral Resources. All of the expectation gaps referred to above are of relevance here, however, this is the point when the main investment decision is made and the accuracy of Ore Reserves and Mineral Resources is of paramount importance.
- Prices – reserves are calculated utilising a cut off commodity price. This is usually selected and used throughout the life-of-mine. Many companies utilise commodity forecasts which vary over the life-of-mine – particularly in impairment calculations. This suggests inconsistent pricing assumptions utilised on an operation which does not, on the face of it, seem logical.
- Consistency – where a company has more than one mine site, there should be consistency in the preparation of Ore Reserve and Mineral Resource Statements. There needs to be prescribed policies and standards that the practitioners follow. The directors should be aware, when approving financial statements, of what are the most judgemental issues in the Ore Reserve and Mineral Resource Statement, and whether there is consistency between the different mine sites within their groups
- The definition of ‘economic’ utilised by accountants is different than that utilised by a geologist. Geologists will call a unit of rock a reserve provided it can be mined and treated for less than it can be sold. The accountant’s definition also takes into account sunk costs carried forward for that ore – ‘profitable’. As an example, presume carrying cost of exploration and development of \$40 per unit. Mining cost of ore will be \$65 per unit, and selling cost is \$100 per unit (see Table 4).

TABLE 4

	Geologist	Accountant
	\$	\$
Sales price	100	100
Mining cost	(65)	(65)
Exploration cost	(-)	(40)
	35	(5)

This ore represents a reserve from a geologist’s perspective, but not from an accountant’s perspective. It is rare that accountants make adjustments to eliminate reserves because sunk costs carried forward do not meet their definition. This difference occurs often, and is particularly relevant in the lower grade parts of ore bodies.

- Experience suggests that grades set out in initial mine plans are often not achieved. These initial plans may also have a much higher degree of accuracy than some of the estimates in initial feasibility, which are the basis of funding approval (particularly if funded internally, ie no debt)
- Ore Reserves and Mineral Resources are estimates and therefore uncertain. Newly appointed geologists can make different structural assumptions that dramatically alter Ore Reserves and Mineral Resources. Such circumstances should lead to directors, auditors, analysts and others asking far more searching questions as to whether they are satisfied with the Ore Reserves and Mineral Resources.
- The competent person is usually an employee of a mine and thus may not have the most objective view. This needs to be carefully considered by all other preparers and users of this critical information.

CONCLUSION

This paper has set out the reasons why reserves and resources are of paramount importance to all users of financial information reported by mining companies. It has also suggested that geologists, engineers, metallurgists, accountants, directors, auditors, investors and analysts do not always understand the interactions between some of these groups of people. With certainty, I can state that inappropriate financial results have been reported by mining companies because reserves and resources were not properly understood by people who used the information, or the estimates were wrong. This is an area that needs considerable attention by mining companies if errors are not to be made. Similarly, there is a lack of understanding about resources and reserves by some regulators that is leading to prescriptive rulings regarding valuations that will reduce rather than enhance the understanding of mining businesses by investors.

