

Ounces into pounds—how much is an *in situ* ounce of platinum worth?

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One of the valuation approaches applied to Advanced Exploration Areas and Pre-Development Projects is the so-called '*in situ* Mineralization Method' or the 'Yardstick Method'. This method is based on the concept of a known undeveloped Mineral Resource being worth a certain fraction (the 'Yardstick') of the contained commodity value ('metal in ground'), using commodity prices ruling at the date of valuation.

The Yardstick value is derived usually from an average market-based figure obtained from an analysis of recent transactions and is expressed as a monetary value per ounce or per tonne. It may be modified to accommodate the quality (e.g. grade) and category (e.g. confidence level) of the Mineral Resource/Reserve involved and the time, effort and expenditure expected to be involved in bringing the project to fruition.

Some eighteen recent and relevant transactions were analysed, allowing the following general conclusions to be reached:

- a Yardstick with which to value undeveloped PGE mineral resources is likely to range between 0.5% and 2.5% of the in-ground contained metal value
- the expected method of mining (especially with regard to mining costs) and the grade of the mineralization both have a strong influence on the Yardstick
- the status (classification) of the Mineral Resource has some influence on the Yardstick and
- the ruling price of platinum and the regional location of the deposit appear to have insignificant influences on the Yardstick.

Introduction

In a world where international competition for mineral exploration and development funds has intensified and where such expenditure is increasingly made by global mining companies, many proactive jurisdictions are moving to establish regulatory regimes with a common fabric. The existence of common approaches to the proper reporting of exploration, development and mining results not only hastens the creation of a global mining industry but it also facilitates the mobility of the technical professionals engaged in that industry and maximized employment opportunities. Reliable and comparable reporting aids not only the market participants (particularly the financiers), but also those responsible for surveillance and equitable operation of the market in the public interest.

Mineral assets are valued for a diversity of reasons, using numerous recognized methods, and hence no simple formula or recipe can be used without critical appraisal of the specific situation at hand. The market is not as open, efficient and transparent as may be assumed and the various valuation methods have caused some confusion over the widely used term 'Market Value'. Different countries even have different definitions of what constitutes Market Value. It must be understood that Market Value does not necessarily equal 'Price'. The latter represents the historical reality of what was paid for the asset, not the future estimate of what is likely to be paid for it after considering the financial motives, capabilities or special interests of the purchaser, the state of the market at the time, the political

climate and numerous other factors which change from time to time.

The critical factor in the valuation is the competence and judgement of the valuator since all valuations are time and circumstance specific and there is no one best method. During 1995, in an attempt to set up a guideline for the valuation of mineral properties, the Australasian Institute of Mining and Metallurgy (AusIMM) established a Code and Guidelines for Technical Assessment and/or Valuation of Mineral and Petroleum Assets and Mineral and Petroleum Securities for Independent Export Reports (VALMIN Code) and a number of mineral producing countries have formulated their own set of guidelines based on the VALMIN Code. The task of these Codes is the development of best practice dealing with the technical assessment and valuation of mineral assets and securities for inclusion in Independent Expert/Specialist Reports that are required under Corporate Law or by the various Securities Exchanges.

The most appropriate application of the various methods depends on careful consideration of several factors and the VALMIN Code 2005 states that:

'The Expert and Specialist must make use of valuation methods suitable for the Mineral or Petroleum Assets or Securities under consideration. Selection of an appropriate valuation method will depend on such factors as:

- the nature of the Valuation
- the development status of the Mineral or Petroleum Assets and
- the extent and reliability of available information.

The Valmin Code 2005 classifies the level of asset development according to the following categories:

- *Exploration areas*—are properties where mineralization may or may not have been identified, but where a Mineral Resource has not been identified
- *Advanced exploration areas*—are those properties where considerable exploration has been undertaken and specific targets have been identified that warrant further detailed investigation, usually by drilling, trenching or some form of detailed geological sampling. A Mineral Resource may or may not have been estimated but sufficient work will have been undertaken on at least one prospect to provide a good understanding of the type of mineralisation present and encouragement that further work will elevate the asset (or a part thereof) to the Resource category.
- *Pre-development projects*—refers to properties where Mineral Resources have been estimated (possibly incompletely) but where a decision to proceed with development has not been made. Properties at the early assessment stage, properties for which a decision has been made not to proceed with development, properties on care and maintenance and properties held on retention titles are included in this category if Mineral Resources have been estimated, even if no further valuation, technical assessment or advanced exploration is being undertaken
- *Development projects*—are properties for which decisions have been made to proceed with construction and/or production, but which have not been commissioned or are not operating at design levels
- *Operating mines*—refers to mineral properties which have been commissioned and are in production.

At the time of writing this paper, the discussion draft of the new SAMVAL Code proposed a similar categorization, with an added category for defunct or dormant properties.

When valuing a Mineral Property, the Valuator should use as many valuation approaches as appropriate for its development status and the purpose of the Valuation, although there have been cases where only one approach has been considered suitable. The values determined by the various methods are compared to identify if there is any consensus between the results to give some comfort as to the reliability of the Valuation.

This paper will focus on just one of the valuation approaches applied to Advanced Exploration Areas and Pre-Development Projects, the so-called ‘*In situ* Mineralization method’ or the ‘Yardstick Method’ as observed by the authors in recent Southern African platinum group elements (‘PGE’) transactions. This method is based on the concept of a known (i.e. classified) Mineral Resource in the ground being worth a certain fraction (the ‘Yardstick’) of the contained commodity value (‘metal in ground’), using commodity prices ruling at the date of valuation.

The value derived is usually an average market-based figure obtained from an analysis of recent transactions in US\$ per ounce or per tonne. It may be modified to accommodate the quality (e.g. grade) and category (e.g. confidence level) of the Mineral Resource/Reserve involved and the time, effort and expenditure involved in bringing the project to fruition.

Valuation by the Yardstick Method will generally reflect the optimism/pessimism of the market at that time, even though it tends to take a longer-term view than other

methods because the creation of a mine on the property is normally some years in the future. Short-term irregularities or volatilities in the foreign exchange market might distort this type of methodology unless judgement is applied, since from time to time a currency may be over or under valued. Also the commodity price in US\$ terms varies more in response to supply and demand for a commodity than it did in the past. Hence, it seems more appropriate when converting US\$/oz PGE into the local currency such as ZAR, not to simply input the exchange rate of the day, unless it is a realistic long-term estimate. This is due to the fact that the time frame of turning a PGE prospect/project into a mine has a much longer time frame than the short-term currency fluctuations.

To differentiate the Yardstick from a pure ‘thumb-suck’, the Yardstick needs to be calibrated. For instance, it is well established (Lawrence, 1994) that shallow gold projects have a per-ounce-value ranging between 2% and 4.5% of the relevant ruling gold price. Base metal deposits generally are worth a smaller fraction of the contained metal value. There are practical reasons for these differences: e.g. base metal mines generally require a lot more exploration, metallurgical test work, capital and infrastructure, and hence carry a larger risk at an early stage than the typical open pit gold mine. The market knows this and allows for it in estimating a transaction value for an early stage deposit.

Other (non-commodity specific) aspects that may also influence the ‘length’ of the Yardstick, include:

- resource classification (confidence)
- grade
- depth of potential mining
- location (infrastructure and services)
- size of deposit and
- market conditions and sentiment.

It is suggested that whatever value one chooses on technical grounds, such as those listed above, sovereign risk must be factored into the final US\$/oz PGE used. There is a reluctance to pay as much for a commodity asset located in a region with socio-political problems compared with one where the fiscal and security regime is benign. Similarly, tenements located in proximity to environmentally sensitive National Parks or where there are as yet unresolved conflicts such as land claims in South Africa, have less value than ones without such problems to address. In some under-developed countries that have not yet implemented stringent environmental rules, investors tend to insist that projects include such rules into feasibility studies and future planning. The rated values from one country to the next depend on factors outside the typical technical factors, listed above, including:

- the political stability of the region and country at large
- its economic policies
- taxation regimes
- the perceived ease with which transactions and operations can be contemplated and concluded and
- environmental legislation.

Security of tenure is also a critical factor. In the minds of investors (and valuers), a country in which mining activities are already taking place provides some useful insight into factors such as the application of mining law and general taxation principles.

The Yardstick Method of valuation has an international appeal due to the benchmark currency that is used, the US Dollar (US\$). Intuitively, converting US\$ to a local currency will depend on the applicable currency conversion rate and since vast volumes of the world’s mineral

resources are exploited in third world countries, currency volatilities render direct conversions to the local currency impractical.

The transactions considered in this presentation vary considerably in many respects, but they were all selected to have one thing in common: all subject projects were in the exploration or pre-development phase with little or no mining infrastructure present at the time of the transaction. In this way it was attempted to derive values related to only the resources, excluding any additional assets. Of course, the ideal transaction would be ‘at arm’s length’, with no considerations other than the deposit at hand. In reality, in an industry with relatively few major players, such as PGE mining, this is seldom so and there are often underlying corporate and sometimes personal reasons (apart from the ‘pure’ desire to acquire PGE resource ounces) motivating a transaction. These are often difficult to analyse and generally impossible to quantify. As many transactions as

are available publicly, warts and all, are considered with the intention that these will show a sensible average and also a sensible spread of values. This range of values is important, since it is very unlikely that one would be able to derive a simple ‘one size fits all’ value, or value equation, for something so variable as the mineral deposits Mother Nature has provided for us. For an experienced valuator it should then be relatively straightforward to position a specific deposit in the correct spot within this continuum of potential values, based on the project’s technical merits and demerits.

The transactions considered in this paper are summarized in Table I below.

The Yardstick ranges from 0.02% of the contained metal value, to a maximum of 2.32%, with an average of 0.63%. The accompanying histogram (Figure 1) shows a heavily skewed distribution, which is to be expected: there are always far fewer ‘good’ projects than ‘poor’ ones.

Table I
Summary of recent transactions involving undeveloped PGE mineral resources

Project	Date	Area	Status	Grade	Moz PGE (± Au)	Price/oz PGE	Yardstick (% of contained metal value)
M	1995	West		5.79 3PGE+Au	0.89	\$0.94	0.54%
M	1998	West		5.67 3PGE+Au	2.53	\$8.68	1.21%
H	1999	East	Ind+Inf			\$5.88	0.50%
G	2000	East	Reserves			\$5.58	0.13%
N	2000	East	‘Inferred’		0.39	\$2.49	0.71%
F	2001	Zimbabwe				\$4.20	0.70%
B	2002	North	Inferred	1.30 3PGE+Au	2.50	\$6.67	0.69%
D	2002	North	Inferred	1.19 3PGE+Au		\$0.72	0.97%
F	2002	Zimbabwe				\$3.79	1.34%
K	2002	West	Inferred		20.56	\$0.09	0.13%
A	2003	North	Inferred	0.55 2PGE	1.14	\$3.77	0.24%
C	2003	North	Inferred	1.31 3PGE+Au	4.19	\$3.53	0.02%
K	2003	West	Inferred		20.56	\$0.82	0.12%
E	2004	North	Inferred			\$6.05	0.88%
I	2004	East	Meas+Ind+Inf			\$1.07	0.22%
J	2004	East	Inferred	5.40 3PGE+Au	7.12	\$2.01	2.32%
L	2004	East	Indicated	4.87 3PGE+Au	1.90	\$7.50	0.48%
O	2004	East	Meas+Ind	5.00 3PGE+Au	12.2	\$1.16	0.14%

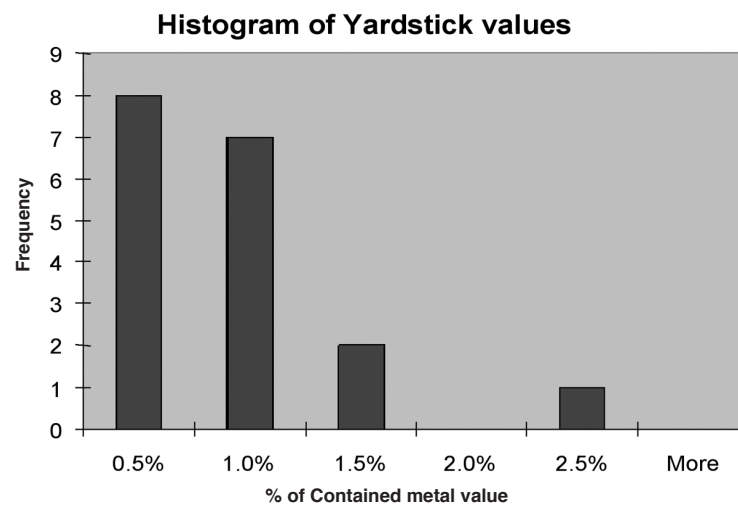


Figure 1. Frequency distribution of price paid for *in situ* PGE ounces, expressed as a percentage of the full value of the contained metal

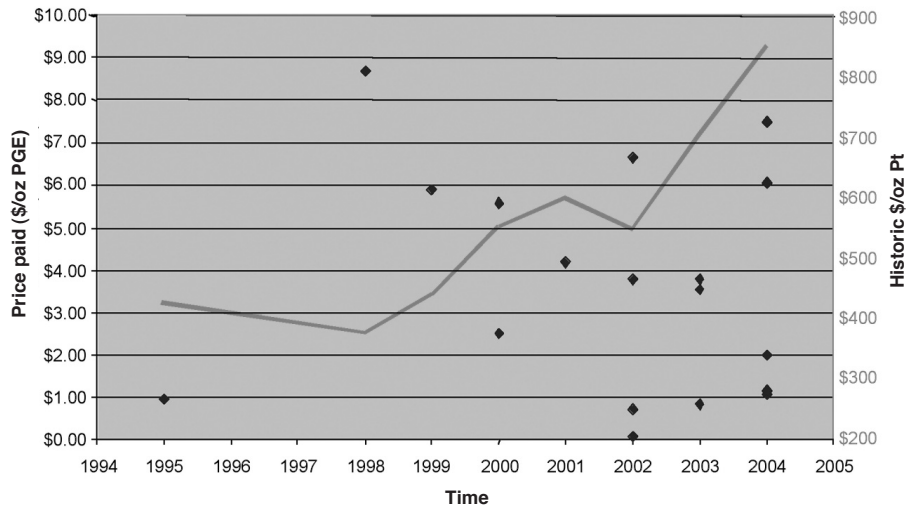


Figure 2. Comparison of price paid for *in situ* PGE ounces with time and the price of platinum

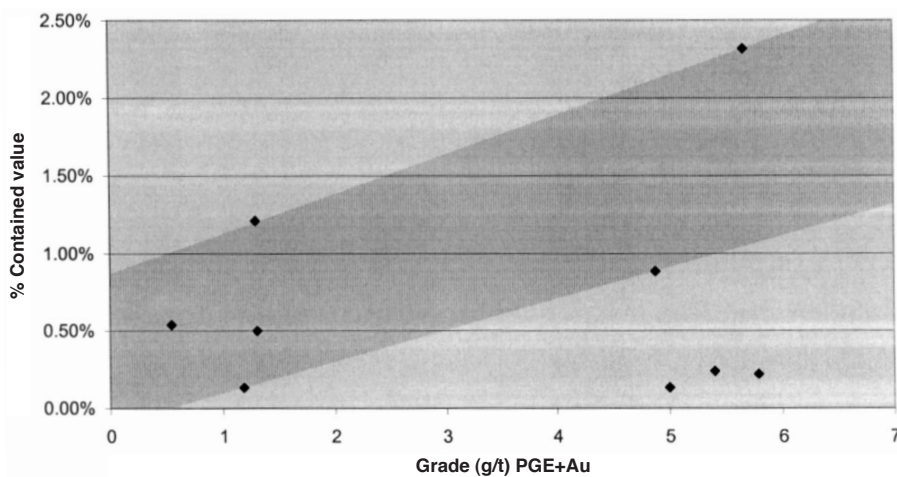


Figure 3. Comparison of yardstick for *in situ* PGE mineralization with the grade of the deposits

From the transactions considered here, it is clear that there is a large variation in potential Yardstick values, mirroring the variation in PGE deposits. Typically, however, the Yardstick ranges between 0.5% and 2.5%, which is very comparable with base metal deposits. This stands to reason, since PGE deposits are in most respects much more akin to base metal deposits than to other precious metal deposits, viz:

- disseminated sulphide style of mineralization
- multi-commodity
- complex mineralogy and commensurate difficult and expensive metallurgy
- large-scale mines
- mainly industrial use of end-product.

Comparison of the price paid per ounce PGE with time and time-based variations in the price of platinum, is shown in see Figure 2. From this graph the following observations can be made:

- There is no clear trend of the price paid with time.
- No correlation is evident of the price paid with the ruling (at the time of the transaction) price of platinum itself. This probably shows that the market (i.e. the market for buying PGE properties) takes a long-term

view and discounts relatively short-term high and lows in the commodity price. Given the time it takes to bring a sizeable mine on line, this seems sensible. However, it does mean that the valuator should exercise care in applying the Yardstick during periods of very low or very high PGE prices.

The subsequent graphics compare the Yardstick with certain technical parameters, which may influence the price a willing buyer may contemplate. The following conclusions are drawn from these graphs:

- At first sight the graph comparing the Yardstick with mineralization grade shows no clear trends (Figure 3). However, ignoring the three high-grade, low-value transactions (two of which refer to a +1500 m depth deposit), allows a discernible trend of higher grade = higher price to be recognized.
- There is also no apparent correlation between the Yardstick and the Mineral Resource/Reserve status of the projects transacted (Figure 4), although it is noted that the preponderance of lowest values falls within the lowest resource category (inferred). This may be interpreted as indicating that mining and exploration professionals do not discount lower order resources by

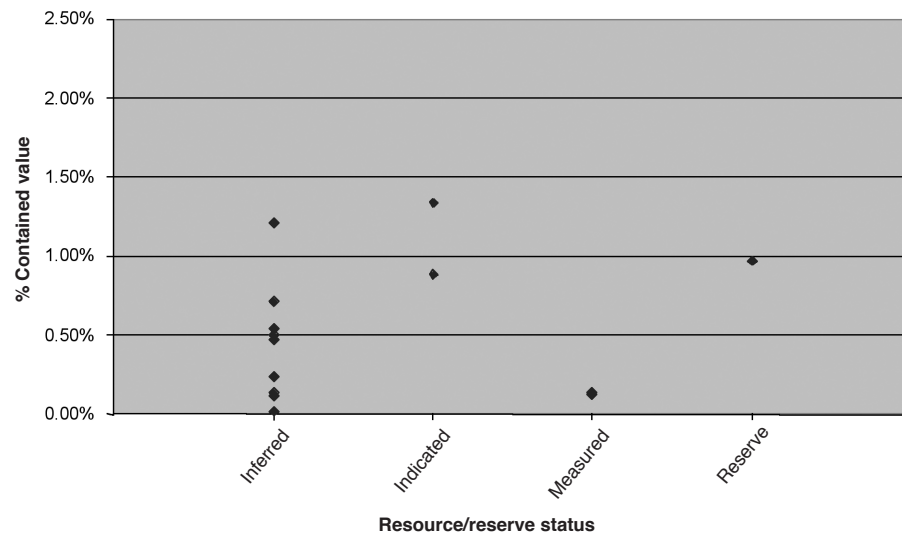


Figure 4. Comparison of Yardstick for *in situ* PGE mineralization with mineral resource/reserve status

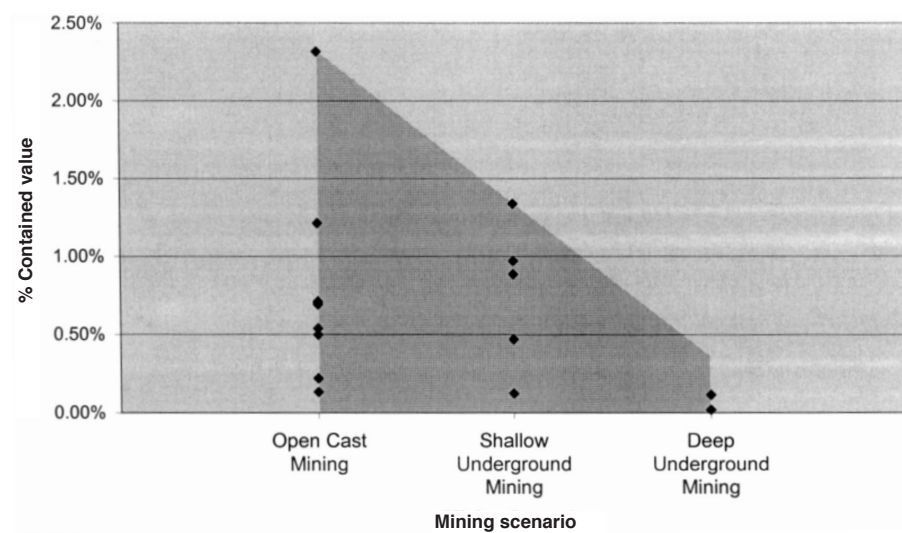


Figure 5. Comparison of Yardstick for *in situ* PGE mineralization with expected/actual mining scenario

as much as their counterparts in the financial world. If an underlying trend of higher price = higher resource status exists, it is perhaps obscured by the variety of deposits included in the (small) data-set.

- Even if described by only a very broad trend, it is clear that lower cost (e.g. opencast) mining methods are more attractive and command better prices for suitable projects, than underground (and worst, deep) mining scenarios (Figure 5). This is why (opencast) projects on the Northern Limb of the Bushveld Complex, with grades around 1.0–1.5g/t PGE, can command a price per ounce equivalent to deep underground projects with grades of +5g/t PGE.
- Projects located on the various limbs of the Bushveld Complex and in Zimbabwe, all have a similar range of values (Figure 6). The merits and demerits of a specific region can be manifold, i.e. Zimbabwe may presently be a difficult region for fiscal and political reasons, but this can be offset by the good quality of the Mineral Resources amenable to opencast mining methods.

Be that as it may, it would seem that no specific region is a clear ‘winner’.

In conclusion, it can be stated that a Yardstick with which to value undeveloped PGE mineral resources, is likely to range between 0.5% and 2.5% of the in-ground contained metal value. Where in this range a specific deposit is likely to locate, is influenced by several parameters as summarized in Table II.

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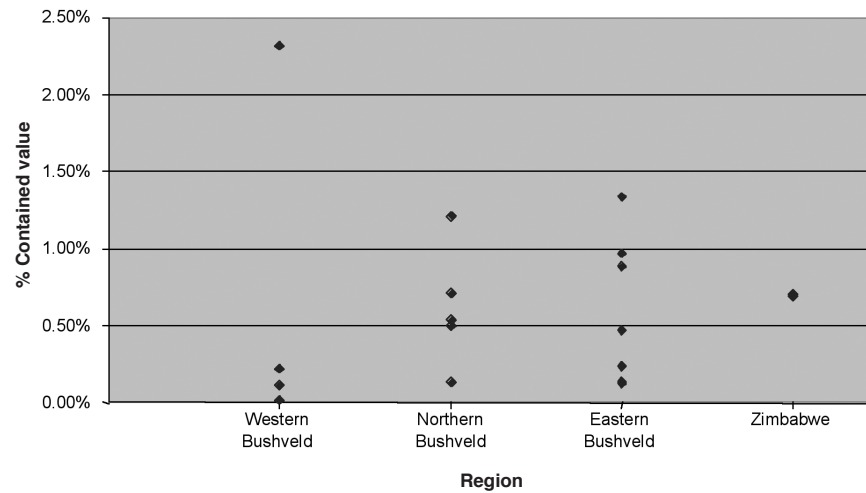


Figure 6. Comparison of Yardstick for *in situ* PGE mineralization with location of the deposits

Table II
Summary of the influence of some parameters on the Yardstick for undeveloped PGE deposits

Parameter	Influence
Expected method of mining (especially considering expected mining costs)	Strong (lower cost of mining leads to higher prices paid)
Grade of the deposit	Strong (higher grades = higher prices)
Status of Mineral Resource/Reserve	Significant (higher order resources = higher prices)
Ruling price of PGEs	Weak
Regional location of PGE deposit	Weak

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