INVESTMENT IN MINING

The special factors to be considered when assessing shares in mining companies, including metal prices, ore reserves, cost structures, the costs and rewards of mining developments and exploration and the problems of assessing new mining ventures.

PART 1 — Mining and the Australian Economy. The recent emphasis on buying the future.

PART 2 — The Distinguishing Characteristics of Mining.
- Ore bodies and ore reserves
- Mines and wasting assets
- The exploration programme
- The cost structure
- The income structure
- Appraising new ventures
- Financing

PART 3 — How Mining has Treated Investors.
- Why financial organisations of world standing are interested.

When the embargo was lifted in December, 1960, on the export of iron ore, and Western Australia again encouraged companies and individuals to explore for this mineral, a new era opened for mining in Australia and for the Australian economy.

The tempo of discovery of mineral fields of world significance had been building up for over a hundred years. Lifting a crippling restriction, as much as the fantastic discoveries which followed, caused Australia to become host to the mining companies of the world to even a greater extent than before.

No one responds to an incentive like a miner. The odds faced by mining companies are immense. There must be the confidence that expert and persistent seeking at great expense will, if successful, produce a prize for the seeker. The incentives of freedom to search and find and develop and, to take risks and win profits, are not the stakes in a gamble, but the rewards which astute businessmen know are necessary if mining is to prosper, or even exist.

The impact on the Australian economy in retrospect as well as prospect is greater than most Australian people recognise, even today. Developments are of acknowledged national importance and the blaze of glory surrounding mining recently has not been fed by a flare up of interest in one isolated metal, even if nickel has burnt brightest just recently. Iron Ore, Copper, Aluminium, Coal, Oil and Gas, and others have focused attention on mineral developments and opportunities.

In 1966 alone the ex-mine value of output rose some 14% to $620 million. Capital expenditure in recent years has been averaging above $150 million, and the Minister of National Development said that fifty projects under construction, expanding or about to begin involved expenditure of more than $2,500 million. These expenditures will finance towns, ports, roads, factories and pipelines as well as holes in the ground. They will help to develop New Guinea and play the role common to mining, of providing a sound basis for economic viability and national growth. In some way or another they will permeate the daily lives of all the people in Australia and the Territories it administers.

But our lecture series is directed towards investment in the stock market and my part in it is to talk of investment in mining.

Of course, there are many types of investors, just as there are many types of mining companies. If you are a speculator, or a penpusher with a secret yen to get out with a pan, a dish, a hammer, then you will be attracted by the exploration companies — be they for oil or for metals. These companies give you a genuine opportunity to get in on the ground floor — to gain the full financial benefits from discoveries. You must, of course, expect to take the consequences of the added risks concerned.

There are others of you who may be traders and you are expert in judging the mood of the market.

Investors in the larger companies with diverse interests and their own substantial exploration programmes (and this is the type I mainly wish to speak about tonight) have no doubt noted a new pattern has developed recently in valuing the shares of such companies.

A while ago major mining companies had not only attained the respectability of leading industrial and commercial investments, but you could almost use the same methods to calculate the value of their shares. The companies with a long term history had shown a tendency to report regular profits or to show a steady growth. Provided you could take a view about metal prices you could calculate, on the basis of existing operations, the expected future profit level and the way share prices may move.

But then new developments of significance started to enter the reckoning of companies and their shareholders, and with an investment say, in tin or aluminium, established, or an agreement signed with a Government over an iron ore field, this was reflected in the share prices. Thus a more speculative element was creeping back in, though generally the market took a conservative view of these things.

In the last year or so, we have seen a move towards discoveries being given great importance before adequate proving had been completed or even exploration had established that an economic orebody is likely to exist. Now the market has gone all the way and having seen
that scientific exploration can produce rewarding results is placing a substantial value on a company's exploration programme.

This, of course, is not entirely illogical. An exploration programme can prove a company's biggest asset. You must just bear in mind that you, as investors, and the stock market in general have had very little experience in this type of share valuation yet, and inevitably it is placing a value on future discovery, some of which may not eventuate. Thus the pricing of mining stocks is somewhat more speculative now than for some time.

My purpose, however, is not to attempt to come up with any magic formula for valuing an exploration programme—that would be very foolish of me. But I do propose to run through some of the distinguishing characteristics of the mining industry. In doing so I hope you will come to a better understanding of the factors investors in mining shares should know about, and use, in their assessment and evaluation of the performance and prospects of mining companies.

PART 2 — The Distinguishing Characteristics of the Mining Industry.

We now come, therefore, to the main section of this lecture tonight when I wish to speak, perhaps a little technically, about those factors which characterise the mining industry. It is appropriate, therefore, that I should speak first of all about ore bodies.

Ore Bodies

Now ore is a natural mineral compound, at least one of the elements of which is a metal. An ore body is generally a solid and fairly continuous mass of ore which may include low grade and waste, as well as payable ore. You shouldn't run away with the idea, however, that ore bodies are nice uniform slabs or masses of ore of consistent quality or grade—this is rarely the case. Some are laid down in sedimentary beds, but these vary in thickness and width and composition. Through time they may have been broken by faults, bent and twisted and partially leached away. They may lie flat or dip steeply downwards, even vertically into the earth. They may be in discontinuous lenses or pods with repetitions above, below or hundreds of feet further away. Knowing how hard it is to find a lost fishing vessel on the surface of the sea, or a missing plane on the land, you can appreciate what problems exist in tracking down extensions and repetitions of known ore bodies below the surface.

In other cases, ore bodies are formed by the thrusting or penetrating of molten ore into or between existing rock formations. You can imagine how the ore spreads, sometimes as fine fingers through the host rock, and in the molten state mixes with other barren materials to present a complex maze to the miner. To mine waste is to turn profits into losses. Mining must be selective. Working areas must be restricted to the minimum.

Of course, the mere existence of an ore body even when its location is known and its composition and characteristics have been defined doesn't make it a potential mine. The grade must be economic, which implies also that the metallurgy for the treatment of the ore must be known, sales outlets assured; it also must exist in sufficient quantities for a viable operation to be mounted. The ore body can then be regarded as an ore deposit.

Ore deposits may outcrop on the surface or be buried beneath a layer of barren soil or rock called overburden, or it may occur thousands of feet underground.

Ore deposits may be high grade or low grade; these terms are, of course, relative.

A high grade iron ore registers in the sixty per cents of contained iron, a low grade may be 45% although lower grades down to 20% are mined and then beneficiated.

Lead grades at Broken Hill run up to 14% and are some of the highest in the world.

The rich pitchblends mined in small pods by United Uranium averaged up to 15 lbs. to the ton of ore while Mary Kathleen was in the 3-3½ lb. category and the huge Blind River deposits at Elliot Lake in Canada averaged around 2 lbs. to the ton.

Gold is mined down to 4 pennyweights per ton. That's a mighty small return for a lot of digging!

Mount Isa Copper ore runs 3.1-3.2% and Bougainville is averaging about 0.6% copper.

When a company speaks of its ore reserves, it is speaking of economic ore which it has proved to its satisfaction exists, and regarding which it can quote with confidence the quantity of ore and grade of metal constituents. Ore which has been proved to a lesser state of confidence may be referred to as probable or indicated ore. These tonnages rarely equal the total ore expectation of a mine, but of course they might do so!

A Mine Is A Wasting Asset

Ore exists. So far as we know no more is being made today. Therefore, while companies may prove up more ore and add to their reserves figures, every ton extracted in fact depletes their ore reserves.

The principal asset of a mining company is therefore a wasting asset.

It may be wasting away quicker than you think, if the high grade ore is being taken first, so the grade of the remaining reserves is important to investors. Once frowned upon, and still not widely practised, the Discounted Cash Flow and present value studies are showing that there can be considerable overall benefit from extracting high grade ore first, if such a course is practicable.

For shareholders the maximum cash is released early in the life of the mine. In the national interest export earnings are maximised earlier, and with early repayment of the major debt financing, lower grade ores can be mined later which otherwise may have been uneconomic, thus waste becomes payable ore.

If you are an investor in a company which is not, through exploration, replacing existing operations with new ones, you can easily get caught. Good profits can put share prices up when they should be coming down, as the cream of the ore and of the profits are being extracted in the early days, leaving future prospects of low profits. This should not worry the original shareholder because he has received his capital back early and, after that, it is all gain. If you rush in and pay high prices when the cream is running out, you will learn the hard way.
The Exploration Programme

Exploration is undertaken mainly for two reasons.

Growth
To find ore deposits to allow a new mining company to be established or an existing one to grow and/or diversify its interests in order to satisfy the rapidly expanding demands for minerals.

Replacement
To replace an existing company's wasting asset by finding repetitions or extensions to an ore body being worked, or new deposits of the same or different minerals.

Recent successes in exploration have caused a great deal of excitement on the Stock Exchange.

It has done that for a long time in mining circles. Accountants of course, write off exploration against profits each year—unless something looks particularly promising. Some would say Accountants are a conservative cold-handed lot!

Should you write off exploration, or

Should you anticipate success, and capitalise it in the price you pay for your shares?

The few comments which follow may help you in answering these questions to your own satisfaction.

Deposits of minerals must be found if life is to continue as we know it today, but the romantic days of the prospector are virtually finished. This leaves the geologist and his colleagues to shoulder the burden of seeking out and proving up the colossal tonnages of minerals and energy resource materials that the people of the world are expecting mining companies to produce. There is no doubt geologists will succeed in doing so, but,

—The cost in effort and money will be considerable.
—Reward will not be directly equated with effort, though I believe there will be a strong relationship between the two.
—There will need to be a continual advance in methods, in specialisation of effort, in understanding of factors determining the location and laying down of ore bodies, of means of penetrating the depths and sniffing out what is there.

There is evidence that techniques will allow the cost of exploration to be contained. As deposits become more difficult to find, so is the geologist more able to define a promising location, and he has a team of specialists to help him in this work. A geochemist will analyse a stream of flowing water, or the soils. A botanist will note an unusual flower or strong growth by plants demanding certain mineral nutrients. Geophysicists will listen to the waves from seismic blasts, and in other ways probe the depths before the first drill hole goes down.

Most exploration targets fail to lead to drilling. Even many of those which do, fail to produce an ore deposit. Nevertheless the mining companies who are spending money on exploration are the ones who are both demonstrating a degree of responsibility and who are showing in a practical manner that effort does bring rewards. Without any attempt at being comprehensive, a representative list of expenditures on exploration in 1966 is as follows.

Expenditure on exploration in 1966 by a chosen group of companies either themselves or through contributions to joint exploration (where disclosed) was—

<table>
<thead>
<tr>
<th>Company</th>
<th>Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aberfoyle</td>
<td>$ 453,000</td>
</tr>
<tr>
<td>Broken Hill South</td>
<td>$1,035,000</td>
</tr>
<tr>
<td>C.R.A. (including</td>
<td>$3,044,000</td>
</tr>
<tr>
<td>Bougainville</td>
<td></td>
</tr>
<tr>
<td>N.B.H.C. (including</td>
<td>$1,480,000</td>
</tr>
<tr>
<td>Bougainville</td>
<td></td>
</tr>
<tr>
<td>Mt. Isa</td>
<td>$1,574,000</td>
</tr>
<tr>
<td>North Broken Hill</td>
<td>$ 535,000</td>
</tr>
<tr>
<td>Western Mining Corporation (15 months)</td>
<td>$ 598,000</td>
</tr>
</tbody>
</table>

Of course, companies going in for offshore drilling for oil, face very heavy commitments. The Shell rig moving now to Portland cost $8 million, the glamour Glomar III cost $7 million and that programme was said to be costing $20,000 a day to pursue, before success led to a substantial scaling up of expenditures.

The Cost Structure of Mining Companies

Mining companies are affected in their costs by the same fundamental quantitative and qualitative factors as other companies, but they do have some peculiarities.

The nature and extent of the ore body. It has been said—I admittedly haven’t checked it, but it sounds reasonable—that 90% of the ore extracted in the world is by open-cut methods, so mining is just a huge earth-moving operation. The remaining 10% is extracted by real mining—or at least what most people think of as real mining—by underground methods.

Economies of scale are much more practical in an open-cut mine than underground, but increasing mechanisation must come to deep mining if it is to survive.

However, in brief, the cost of mining ore is dependent on, whether open-cut or underground mining methods are to be used, the depth of overburden to be removed, or the depth of the shaft necessary, the complexity of the orebody—how mixed up the ore may be with barren material—how wide and deep the seams are and how strong is the host rock formation and so on, the grade of the ore, how big an operation is practicable, the degree of rehabilitation needed after mining is completed, as well as other factors of which the labour contract is an important one.

When dealing with an ore body like Mount Tom Price, where there is little overburden and the orebody is reasonably homogeneous and high grade, you move in with huge equipment and take out ore, each ton of which contains enough iron to build a small motor car.

At Kalgoorlie, miners tediously extract and mill a ton of ore to produce enough metal to cover your little finger nail.

Obviously you can’t afford to treat a ton of ore unless it contains enough metal to pay for its treatment. Every ore body contains a mixture of grades, Mines calculate a cut-off grade and reject ores assaying less metal than this cut-off grade.

Metal prices, costs including royalties and taxes, and the scale of operations are major factors determining how low grade ore can be treated profitably.

Thus—

Higher prices, and lower costs do two things which please companies and investors alike for a mine—

• they increase immediate profits, and
• decrease the cut-off grade thereby increasing the ore reserves, that is the total quantity of ore
in the mine which can be treated, thereby increasing the life of the wasting asset.

The scale of operations contributes to the lower costs, thereby making low grade ore bodies economic when they can be mined on a huge scale. The outstanding example is, of course, the Bingham Canyon mine in Utah, which has for years treated 0.8% grade copper. It is treating 30 million tons of ore a year.

**The Quality of Processes**

The quality of processes is measured by success in achieving low cost recovery of as much as possible of the metal in the ores, and producing a high grade and pure concentrate. It is never possible to retrieve all the metal, but a small variation in percentage recovery can have a substantial bearing on the economic viability of a mine. A higher grade concentrate can save transport costs.

The companies own operating and research staffs aided by C.S.I.R.O. and A.M.D.E.L. contribute greatly in this regard. Species problems temporarily defy solution such as the economic recovery of zinc from the MacArthur River ores, but no doubt these will be solved.

Fundamental metallurgy is re-examined in attempts to discover cheaper and similar ways of producing metals and of making uneconomic ores profitable.

**The Quality of Personnel**

In an industry where—

- slight improvements in the ratio of ore to waste, or the metallurgical recovery can have such a decisive bearing on profits,
- where proper human relations are vital to safety and continuity of operations,
- the quality of personnel — underground miner, 100-ton truck driver, mill operator, highly qualified manager—is, of course, important in any consideration of the cost structure.

**Remote Locations**

What does remoteness mean in the construction phase?

Firstly, the infrastructure is often non-existent or inadequate.

Railways, Ports, Towns, Power Plants of the highest order are quite normally built and paid for by mining companies these days. This hasn't always been so. The railways to Mt. Isa and Broken Hill for instance were provided by Governments, and miners erected their homes as best they could.

Today, help may be forthcoming from Governments where it is considered necessary to allow a mine to get under way, but more and more the basic services are built and paid for by the mining companies. This has some advantages. Services are built to their own specifications, according to their own time-table and operation is within their own hands. However, the effect on the cost of capital (as well as the total amount of funds to be raised) and the total amount of risk is readily apparent.

The operating cost structure of a mining enterprise, particularly a successful one, is increased by reason of a remote location. A number of factors contribute to this.

In an economy based on full employment, labour will go to remote places only for above-average rewards.

Mine managements have recognised for some decades, employees' claims to compensation for living in remote areas by granting direct cash benefits, helping them with housing and by making contributions to the town in which they live, and of course in matters of health and schooling, and by decentralising centres of learning, even Universities and Institutes of Technology.

The cost of transporting men and materials is obviously high and freight constitutes one of the major headaches for mining companies. Inland freights are always expensive. One large item imported by Mary Kathleen when it was operating was sulphur. It cost more to freight it from Townsville to M.K. by rail and road than it cost to buy the sulphur in Texas and transport it across the Pacific and load it into rail wagons at Townsville.

About the only thing which is cheap in an isolated locality is land. This is one thing, however, a mine is not called on to buy. Miners do not own their land, they lease it and pay a lease rental to the Government.

**Mining Royalties**

Payment for the ores extracted is to Governments by means of a mining royalty which is levied on many different manners and at a great variety of rates. Most States have set schedules according to the mineral being extracted, but special rates are commonly negotiated for large mining properties.

Royalty rates may contain incentives. Queensland offers half royalties for the first five years to help a mine become established. The iron ore royalties of Western Australia are 60 cents per ton for straight ore, and 30 cents for fine ore. However, it comes down to 15 cents for all ore which is processed in Australia.

From an investor's viewpoint royalty can be just another cost to be borne, but it can be an important one, and where, as in the case of the Broken Hill mining companies it is levied at a progressive rate on profits, it can be a significant factor in the growing prosperity of a company.

**Taxation**

Taxation is included in this discussion of the cost structure because I believe it to be a cost item. The incidence of taxation is a major factor in determining whether a project can go ahead or not. Also, with viable projects, a more favourable taxation formula will allow a lower ore cut-off grade thereby increasing the tonnage available for treatment.

The Mining Industry enjoys some special consideration in Australian Taxation Laws in recognition of the initial risks involved, the huge capital needed, the wasting nature of its assets, and its contribution to the national economy and the national interest. This is a subject of its own, about which investors need to have some knowledge. I can only make a passing reference to it tonight.

The income from some mining is exempt—wholly as in the case of gold, or as to 20% for copper, rutile, nickel, tin and some other minerals. No such exemption applies for iron, lead, zinc, etc., so it is not universal. However, where it does apply, dividends paid from the exempt income are also exempt in shareholders' hands.

Deductions for capital expenditure are somewhat more extensive and more flexible than for industry.
generally. Speaking very generally, capital expenditure can be written off as quickly as profits are available. Some mines, therefore, are not paying tax because they have capital deductions available. Unlike the gold companies, this favourable situation will pass (and you will want to know when) and also dividends will be taxable in shareholders’ hands.

Of course, there are also the well-known call deductions — 1/3rd of calls paid to mining companies, and all calls paid to petroleum companies are deductible — if the companies are directly engaged in these activities and certain other conditions are met as they usually are.

The Income Structure
There are two items worth mentioning here.

Metal Prices
Price fluctuations have been the delight of the shrewd speculator and the torment of the serious investor and mine manager alike in the past, not to mention that important fellow — the consumer. The swings and uncertainties in most metal prices have been so great and so unpredictable that efficiency of the mining industry has undoubtedly suffered. It is not surprising that the great surge forward we have seen in efficiency in the industry has brought with it an attempt to deal with prices.

For mining, prosperity is largely determined by metal prices, and these are governed by world patterns of production and consumption. The consumption of metals is destined to rise substantially but, speaking generally, I am not so sure about price. Perhaps what I mean can be best demonstrated by reference to three metals which have behaved very differently in the past —

Nickel, Zinc, and Aluminium.

Nickel
I wonder if half of the people who rush off to buy shares in companies who even mention the word nickel in their sleep, know very much about it. It’s of silvery grey colour — like all metals except copper and gold.

Nickel is of course mainly used as a brightening and hardening agent in alloys to produce stain-

less steel, nickel silver, copper-nickel alloys, as well as for electroplating. For some reason salesmen have gained a strong foothold in the consumer industry and have done a mighty good job. I only hope it is a lasting one, because U.K. and Australian investors have ploughed — thrust is more like it — thrust great sums into nickel investments in Australia in recent months.

Consumption growth was somewhat spasmodic through the fifties — even 1963 was below the previous two years — but since then Western world consumption has risen by 18% p.a. to 420,000 tons last year and is forecast to reach 1½ million tons by 1980. That might prove a bold prediction, but at least it seems set for solid growth.

The price of nickel remained unchanged for nineteen years from 1929 at 35 U.S. cents per pound. In 1948 it broke away and in six stages jumped to 74 cents by 1956. Since then it has moved as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Price</th>
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<tbody>
<tr>
<td>1961</td>
<td>81½ c</td>
</tr>
<tr>
<td>1962</td>
<td>79c</td>
</tr>
<tr>
<td>1963</td>
<td>77½c</td>
</tr>
<tr>
<td>1966</td>
<td>85c</td>
</tr>
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(To end of August, 1967.)

Zinc
Production has, with few set-backs, climbed steadily at about 4% compound per annum.

Consumption has also increased but, in the Western world in three of the last ten years, including this year, it has fallen short of production. If Communist statistics are added, consumption has fallen short of production in six of the ten years and this has led to unpredictable quantities of metal finding its way on to Western markets. The large U.S. stockpile surplus of zinc has also been of grave concern to the market, though in the 1965/66 period of zinc shortage it assisted the industry.

Prices have taken the brunt of changes in the demand pattern and a 5% surplus in production could cut price levels in half. Price swings have been violent.

<table>
<thead>
<tr>
<th>Year</th>
<th>Price</th>
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<tbody>
<tr>
<td>1946</td>
<td>£42</td>
</tr>
<tr>
<td>1951</td>
<td>£171</td>
</tr>
<tr>
<td>1958</td>
<td>£65</td>
</tr>
<tr>
<td>1960</td>
<td>£9</td>
</tr>
<tr>
<td>1962</td>
<td>£67</td>
</tr>
<tr>
<td>1964</td>
<td>£118</td>
</tr>
</tbody>
</table>

Now — in the high £90’s. And those prices are yearly averages (£U.K. on the L.M.E.) and therefore mask the extremes and the day to day fluctuations.

Longer term planning and the threats of substitution by Aluminium, which has a higher, but more stable average price level, caused producers to think deeply and attempt price stability. They announced in mid-1964 a “Producer” price of £U.K.125 for zinc— then some £15 below the L.M.E. This price was soon reduced to £110 and has only been altered twice since 1964, and now stands at £98. It is at present supported by cuts in zinc production at smelter rather than at mine level.

In a purely voluntary system in which not all participate, you wonder how long it can last. It must be seen by the consumer to be of benefit and not viewed as a restrictive practice. It must remain flexible, not supporting prices to the extent that producers see opportunities lost for entering new markets. There are reasons for hoping wisdom will prevail.

As an attempt to bring some responsibility into the pricing of metals, it must be welcomed, and help to upgrade the quality of mining shares as well as facilitating long-term planning by mining companies and metal fabricators.

Aluminium
Aluminium was 25.4 U.S. cents per pound in 1923 and offers at 25 U.S. cents per lb. today. In the war years it fell to 15 cents and in 1957 reached 27½ cents. Just as zinc, lead and copper are examples of extreme operation of the laws of supply and demand, affected by relatively slight world surpluses and deficiencies, so aluminium is a model of price stability.

Aluminium production requires huge capital, and production has been in the hands of relatively few people. The economies of large-scale plants coupled with the prospects of dramatic increases in consumption have generally led to some over-capacity in the industry. The benefits of scale and of very high efficiency have been passed on to the consumer by an industry which has clearly seen the attractions to the consumer of a steady price.

In this way aluminium has established itself remarkably well, substituting for steel, copper, zinc, as
well as establishing its own niche in the metal market. Always very active in market research and closely aware of the needs of its customers, it is a metal with an assured growth ahead of it.

Sales Contracts

In a world so hungry for most metals it is not essential for a mine to have entered into forward contracts for all or even most of its output, but it is becoming increasingly regarded as good business for mines to do just this.

The new phenomenon, however, is for contracts stretching far into the future at fixed prices.

The fixed price contracts for rutile of about the same period proved very beneficial to producers as the world price of rutile fell substantially during that period.

Iron ore contracts worth over $3,000 million have been written mainly on the basis of fixed prices extending well into the future. This provides a high degree of certainty as to income, inevitably exposes the seller to the risks of inflation and a cost-price squeeze.

How serious are these risks?

The risks can only be viewed against the incidence of fixed costs and prospects for economy of scale in each particular mine. The iron ore mines of Western Australia, with huge investments in heavy equipment, railways, towns, ports, are obviously capital intensive and largely insulated from the effects of inflation and cost escalation for many years ahead. Also there is room for expansion at lower marginal costs so economies should offset other rises.

A mine concerned with a complex ore body allowing little mechanisation would be very differently placed. Mines of this type would avoid this type of contract if they could. We have seen the effects of a forced fixed price on the Kalgoorlie goldmining companies, despite a marvellous record of economies in operating costs.

The discipline of compiling the detailed cash flow estimate necessary for financial appraisal of a venture has profound benefits. The availability of mathematical methods of analysis and computers to perform the great volume of intricate calculations, makes such appraisal economically worthwhile and practical. Knowledge that the final predictions depend entirely upon the reliability of basic data, justifies, indeed demands, thoroughness in fundamental studies. Financiers can use this information to re-appraise the venture and reach their own separate conclusions on viability. Often, these days, very little extra work is necessary by financiers because, regardless of the expertise of their own staff, mining companies tend to call in consultants of world standing to check their work and advise whether yet better alternatives are available.

As these methods are improved and progressively perfected, so can the final outcome of a mining venture be predicted with increasing certainty. A low-grade deposit needs more spent on it than a high-grade one, as the marginal profits are more susceptible to minor improvements in cut-off grades, sequence of working the deposit, and perfections in financing. Also, the volume of ore to be proved for a viable operation is relatively very much greater.

Obviously, enough information by means of drilling and underground exploration must be collected to allow ore reserves to be calculated and design for development of the mine to be worked out — say — for the first 20 years of the mine’s life. This is why more than a hundred thousand feet of drilling and some three thousand feet of underground tunnelling will be involved on Bougainville where the copper deposit is immense, but of low grade. Statistical studies with the aid of computers are determining a wide range of possibilities for the design of the mine and sequence of extracting the ore. Detailed metallurgical studies allow processes to be worked out and compared, and metallurgical recoveries calculated and improved.

Market research studies allow price and other assessments to be made. Together with the many other factors, such as tax arrangements, shipping and housing and so on, financial appraisals of the many alternatives available indicate the most favourable development and extraction programmes.

Financing

Financing the successful prospect has been accorded considerable attention recently not only by Chairmen of such groups as C.R.A. and Mt. Isa Mines, but through Press comment on the problems and achievements associated with Nabalco (the Gove Aluminium Prospect), Mt. Newman Iron Ore, and Hamersley Iron. Quite clearly, if substantial sums are being sought, investigations such as that described above prove to be of considerable help when approaching overseas bankers and institutions.

A relatively recent development has been the use of high-gearing ratios to finance mining development. They should be of interest to shareholders, as it increases their chances of good profits, but could weaken the security of their investment. Mary Kathleen’s 1958 Balance Sheet, the first after produc-
tion commenced, showed finance provided as follows:

- Paid in by Shareholders 25%
- as Equity — 6%
- as Loans — 19%
- Borrowed Capital 75%
  - Local (overdraft) 14%
  - Overseas source 61%

Hamersley Iron, in its 1967 Prospectus, also issued within its first twelve months of production, disclosed,

- Paid in by Shareholders 33%
- all as Equity
- Borrowed Capital 67%
  - Local (overdraft) 6%
  - Overseas sources 61%

In both cases, financing was supported primarily on long-term sales contracts with pricing defined. The considerable benefits to Mary Kathleen's shareholders was demonstrated over the contract period, and the stock market obviously expects significant benefits from Hamersley as well.

The method of financing alone does not provide the benefits — far from it. However, when a detailed and expert appraisal of prospects by thoroughly reliable people indicates a return on total funds comfortably above the after tax interest rate on borrowed monies, and continuing income is assured by contracts, then shareholders can be relaxed about security and expect to earn a good return on their investment when the gearing is high.

PART 3 — THE STATUS OF MINING AS AN INVESTMENT

Well, that's a long list, you say.

Mining is different, after all — even today.

Is it worth while learning a different language?

I have dwelt, of course, on the distinguishing characteristics, and a recital of differences makes some people more cautious. That may be a good or a bad thing. What I hope I have done is to help you to be objective.

In keeping with this objective approach I should also point out there is a record in the past which shows that mining has been kind to its faithful, though discerning, investors.

The most obvious one to trot out is the Sydney Stock Exchange Non Ferrous index and compare it with movement in the All Ordinaries index. Here it is, in five yearly periods over the last twenty years —

<table>
<thead>
<tr>
<th>Year</th>
<th>Non-Ferrous Ordinaries</th>
<th>All Ordinaries</th>
</tr>
</thead>
<tbody>
<tr>
<td>1946</td>
<td>115</td>
<td>123</td>
</tr>
<tr>
<td>1951</td>
<td>198</td>
<td>166</td>
</tr>
<tr>
<td>1956</td>
<td>352</td>
<td>178</td>
</tr>
<tr>
<td>1961</td>
<td>596</td>
<td>294</td>
</tr>
<tr>
<td>1966</td>
<td>1328</td>
<td>322</td>
</tr>
</tbody>
</table>

Overall, of course, the mining index has increased over eleven times against less than three for the all ordnaries. This year has hastened the trend, as you well know.

You will also find, though I'm not going to prove it here, that had you—or your forebears for you—chosen to invest in any or all of the leading mining companies which thirty years ago looked a sound investment, you would have had a broad smile on your face tonight. The same would apply had I said twenty years ago—or ten years ago.

Of course, great sums have been wagered and lost, too, by people just out for a quick profit, and if you want the chances of really spectacular gains, you must be ready to take the corresponding risks.

There are many people who believe quality of management to be a more important factor than the right choice of an industry. I have paid tribute to the quality of personnel and mine management but have failed to mention the calibre of the men at the top. My observations, for what they are worth, indicate to me that mining has attracted quite its fair share of outstanding leaders in Australia and elsewhere, but I may be biased — you must look at this question for yourselves and make up your own minds about it.

The success of an industry is inextricably bound up with the quality of its management. In looking at individual mining companies in order to make your choice as to investment, an "inner circle" knowledge of the men engaged in management is helpful. However, this is available to very few. The most reliable assessment is made through the news of achievement, responsibility in approach to new ventures, the manner in which the inevitable problems are tackled and overcome.

This knowledge may take some time to build up, but mining companies generally are forthcoming with information so you have good opportunities of assessing their management.

Perhaps we chaps who are thinking of buying the odd equity shares in mining companies may gain a good lead in assessing mining as an area of investment by asking WHY

The world's most responsible and discerning financiers

Applying the most acid tests

Are willing to lend huge sums of money

On the basis of surprisingly high gearing ratios and without asking high interest rates.

May I suggest that they are satisfied about the industry and the men who run it because —

- Minerals are fundamental to life

Non-metallic minerals are seen as the answer to hunger, through fertilizers,

Minerals supply the steeply rising demands for fuel and energy, the means of transportation, and are vital to communication and accommodation,

Minerals and metals remain unchanged by fashion or circumstance but are increasingly adaptable to expanding and changing demands.

- Demand growth is assured and considerable

The world population of 3,500 million people is expected to double in 35 years.

The G.N.P. per capita will also increase, taking larger proportions from subsistence into more advanced economies.

Uses of metals are increasing through the demands of the space age, colour television and so on.

- A healthy mining industry just must be encouraged

Australian mineral production in 1966 reached some $800 million (total value). Taxation incentives have played a part in encouraging 140 foreign companies of substance to search here for minerals as well as encouraging local enterprise. Export income should at least double from the 1965 figure of $285 million by 1970. Conflicts arise in defining what constitutes the national interest, and while some
actions are puzzling, basically Australia cannot afford to tarnish its history of growing responsibility towards the mining industry.

- It is basically an International business
  The climate is familiar to the international financiers. The integrity of the men associated with the industry, like Mr. W. S. Robinson and Lord Bailleul, to mention two who have recently passed from the scene, is known and highly respected. Skills, Capital, Men move freely about the world, and the methods of doing business are known internationally.

- Markets are world wide
  The restrictions of size faced by so many Australian businesses are largely absent. The advent of bulk carriers is making this even more true. The substantial long-term contracts which flow from this situation are, of course, a most important safeguard to lender and equity investor alike.

- The prospects of new ventures are appraised carefully
  The skills to do this are not easily come by, but they are being learnt quickly and effectively. Where risks are greater, so must thoroughness offset them. $10 million and more will be spent in evaluating the Bougainville copper deposit before any commitment to construct is entered into. Spending so much is a risk in itself, hence thorough reviews of the unfolding prospects are made to a regular and carefully designed pattern.

- The finances and profits of established mines are closely controlled
  Whereas once fume went to atmosphere, Port Pirie, for instance, today recovers more than 20,000 tons of sulphur and 18,000 tons of lead “from the smoke”. Mines are often showplaces today. These external evidences of responsibility reflect an even greater growth in efficiency, and these improvements are broadly based so they apply not only in technology but in human relations and financial control as well.

  Thus, forward planning for meeting long-term contracts and for repaying loans and meeting profit targets can be increasingly relied upon.

  These are some of the more important reasons why large overseas financial organisations, and to an increasing extent those in Australia also, have sufficient confidence to invest heavily in mining companies. Many of the answers given would apply to other industries also — but, not all. Of course, not all mining companies would measure up, either.

  A history of hardship, of great riches for some and disappointment for most, of hazardous working conditions and small under-capitalised, under-managed ventures still characterises mining in the minds of many people.

  But, today, mining is fast becoming a truly international business intent on marrying the rewards of enterprise with sophisticated management techniques to produce a responsible and profitable industry contributing to investors and national development and international trade. Those who would seriously contemplate investment in it must therefore be willing to watch the world economic climate, because that is the habitat of the mining industry.

  For a small investor who hasn’t the opportunity to watch the scene closely, it may, for this reason alone, necessarily remain speculative. Furthermore, the timing of entry into equity shares is important. A boom time is a difficult time for anyone to enter.

  For those who are willing to spend the time or use available resources to understand the industry and the climate in which it works, mining can present both a remarkable record of past achievement and good sound opportunities for the future. Of course, what I am saying now applies to many types of investment, but I happen to be speaking of mining investment, and perhaps it applies a little more so to mining than to others anyway.

  Well, there you have it.

  The distinguishing characteristics of mining—the factors to be taken into account when deciding if and how to invest.

  And now it is for you to make up your own minds about investment in the mining industry.

  21st August, 1967

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**N.S.W. ADDRESS—**
from P. 7

theless, there must be some scope for a written expression of members’ views on the practice of security analysis.

At the beginning of this short address, I stated the Society’s main object and I would now emphasise “to act as a consulting body”. I am convinced that our meetings have provided opportunities for the expression of views by our members — both formally and informally — and I hope that this interchange of views will continue to be the greatest benefit which the Society can provide.

I firmly believe however that when there is some uniformity of opinion it is necessary to commit this opinion to writing for the benefit of others.

I have great hopes that the project will produce some guide lines and ideas which will be of considerable value not only to our own members but to all those who engage in the practice of assessing investment in Australian companies.

I hope too that when completed it will mean that the views and experience of a number of our members have been set down in writing and that a base for further discussion will have been provided.

We must ensure a greater percentage of accurate forecasts even though we will still be faced with the problem of being wrong in the short term and right in the longer term or vice versa when recommending an investment.

It is the study and appraisal of these other factors which I think should engage our thoughts for the immediate future.

“How many times was the long chain of chance and coincidence strung again to justify a rule. If the rule be derived then by whom . . . perhaps we would see some light if all the pertinent judgements and reasonings of men were known to us.” — Montaigne (II-37).