HISTORY OF GOLD MINING IN SOUTH AFRICA

It has been said many times before that Johannesburg is a city built on gold. Without any doubt, its 100 years of existense is as much a history of gold mining industry as it is a history of the people responsible for the emergence of a modern South Africa.

It was the discovery of a rich conglomerate reef on the Witwatersrand farm of Langlaagte in 1886 that confirmed the hopes and expectations of the many thousand of prospectors who, in the mid years of the 19th century, poured into this barren country north of the Vaal — and it is to this discovery that Johannesburg owes it very existence.

South Africa's gold mines produce approximately 70 per cent of the Western World's annual supply and more than 50 per cent of the entire world production. There are more than 40 large gold mines on the seven major goldfields, with one of the mine's individual annual production figures far exceeding those produced annually by the entire gold mining industry of the United States of America. The Witwatersrand gold mining complex in fact produces more gold in one year than the world did in any century before 1900 AD.

Extracting the gold bearing ore from a strip of rock averaging 15 cm in width and situated deep in the earth's crust is, however, no simple task. Some mines reach as far as 4 km in depth, and, each year, some 1 000 km of tunnels, raises and ore passes must be developed to advance the 300 km of stope faces an annual 60 m. Working in one of the harshest environments known to man, the South African gold mining industry has encountered the problems facing it with skill and ingenuity and is, today, undoubtedly the technological leader in its field.

But, although gold is instrinsically linked to the last 100 years of South Africa's history, its lure has been felt by the many drawn over the centuries to this southern tip of Africa; even neolithic man —who crossed over the land bridge into Africa and spread south as far as the Cape of Good Hope, leaving traces of his migration in many places. One of them was gold which, gathered from the streams, has been found in many Neolithic graves.

Old workings, dating back perhaps 500 years, bear testimony to an early gold mining industry in the Transvaal. Some of these workings are surprisingly extensive with several thousand tons of gold bearing rock having been removed in places to depths of 15 m.

Travellers and adventurers in the early 19th century also left ample reference to rumours of vast mineral wealth in the lands beyond the borders of the Cape of Good Hope. One Sir John Barrett, for example, writing of his travels in 1801 and 1802 stated that he found gold in the Orange River and he gives a map in which a range of mountains, in the approximate position of the Witwatersrand, is marked 'high mountains supposed to contain gold mines'.

Carel Kruger, a distant relative of Paul Kruger, returned to the Cape from a hunting trip in the early 19th century bearing gold he reputedly found in the neighbourhood of the Witwatersrand. And the renowned Great Trek leader, Louis Trichardt, writing in his diary in 1836, noted that gold was being washed from the streams in the north (near the present day town of Louis Trichardt).

By the 1870s, many more rumours of this nature had filtered through to an outside world already heady with the fever of gold, and had ushered in a period of intensive prospecting which was gradually converging on the Witwatersrand and would lead logically to the discovery of the great Witwatersrand goldfield.

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In the early days of mining on the Witwatersrand, the techniques used were extremely primitive; a few shafts were sunk but, in general, mining consisted mainly of trenching the outcrops to depths of 20 m or so. A visitor to the Witwatersrand in 1887 described the scene he saw as follows: 'taking their cue from the Witwatersrand (Knights) Company, nearly the whole of the Main Reef claim holders about Johannesburg are engaged purely and simply in surface mining'. He spoke with admiration of the Jubilee property where there was "one shaft down 60 feet in depth and another 30 feet in depth, and these were to be connected at 60 feet depth by a drive." He highly commended the work done at Langlaagte by the J. Robinson Syndicate where 'five shafts are being sunk, one being nearly 100 feet down'.

These early miners were fortunate in a number of re-

spects. The climate was good, the ore near the surface was rich and labour was available. However, working against them was the isolation of the Witwatersrand, the lack of transport and numerous other intermittent problems such as shortages of fuel, water and food.

The difficulties experienced in overcoming these problems contributed significantly to the realization that mining the gold deposits on the Witwatersrand could not be handled successfully by individuals and claims would need to be amalgamated if the promise of vast fortunes was to be realized. The year 1887 saw the emergence of the first financial mining corporation, Consolidated Gold Fields, to be followed shortly by the establishment of Consolidated Investment Corporation in 1889.

To look after the interests of the Industry, a Diggers Committee was formed in 1886, followed by the first Chamber of Mines in 1887 and the present Chamber of Mines which was established in 1889. The establishment of these groups soon bore fruit with pressure exerted on the government of the Zuid Afrikaanse Republiek resulting in the accelerated establishment of railway connections with the coastal towns.

During the 1880s another problem arose of a magnitude which threatened the future of the entire industry. It was found that at depths below the oxidation zone the sulphide ore gave so low a recovery (less than 60 per cent) with the amalgamation method then used, that most of the mines became unpayable. The problem was eventually solved in 1890 by the use of the Macarthur-Forrest cyanide process.

From this date onwards, the history of the industry is one of a steady advance in technology, knowledge and skill, inevitably accompanied by a rapid expansion in gold output.

Thus gold had brought into being, to some it seemed almost overnight, one of the most important financial and business centres in the world. So rich was the 121 km belt known simply as 'The Reef', that for a long time mining activity was confined to this area. However, the hunt remained as keen as ever and with mining houses replacing the individual prospectors in the search for gold, other goldfields could not remain elusive for long. The beginning of the 20th century saw the discovery of the Far West Rand goldfield, but shaft-sinking efforts proved abortive because of the presence of large quantities of underground water. In 1931, a German geophysist, Dr Rudolph Krahmann, backed by Gold Fields of South Africa, set out to trace the 'lost' Reef to the west of the Witwatersrand by using a magnetometer to locate the magnetic shale-beds associated with the gold-bearing ore. Geologists, engineers and company officials studied the magnetometer readings and set up their drilling rigs in search of the elusive Main Reef.

Below thick layers of ancient lava they struck the reef now known as the Ventersdorp Contact Reef. Later the Elsburg Reef and the Carbon Leader were discovered.

But a sheet of dolomite, 1 259 metres thick in some places, still guarded these rich reefs. Within the dolomite layer lurked millions of tons of water, mud and sludge. To find a way through, engineers turned to a cementation process. They broke through the water-filled dolomite by injecting vast quantities of liquid cement into the dolomite ahead of their shafts, pushing back the water and plugging the fissures. Blyvooruitzicht gold mining company poured three-quarters-of-a-million pockets of cement into the dolomite during shaft-sinking operations. West Driefontein in its early stages pumped about 160 million litres of water to the surface daily — only to be threatened in 1968 by water pouring through a fault in a dyke and into the mine workings at the rate of nearly 400 million litres per day. To date, the mines of the Far West Rand have cost about R1 000 million to establish and operate.

General technological advancement, and the encouragement generated by results on the Far West Rand, led to the exploitation of another goldfield near Klerksdorp, where gold and uranium mines such as Buffelsfontein, Hartebeestfontein, Vaal Reefs and others are now situated.

New techniques also paved the way for the development of the Orange Free State goldfield. The most dramatic, though not the first discovery in this area, occurred on April 16, 1946. A charge-hand driller named 'Lucky' Hewitson found himself at work on his 13th borehole on the farm Geduld near Odendaalsrus. He extracted, from 1,2 kilometres beneath the surface, a small core of rock containing a tiny sample of gold (worth about 95 cents). The core assayed 100 310 centimetregrams, a strike so rich that the world found it hard to believe.

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The discovery of gold at Geduld was as sensational as the discovery of Kimberley's diamond 80 years earlier and the first gold strike on the Witwatersrand 60 years earlier. Geduld (Patience) was aptly named. The area had been sporadically prospected for nearly 50 years. Scientific search had been in progress almost 18 years and the goldfield had been gradually pinpointed by drilling more than 470 boreholes — the equivalent of a man drilling a hole from London to Geneva.

On a farm near Welkom one unlucky pre-war prospector had drilled down 1 235 metres before giving up. Anglo American Corporation came back two decades later, drilled another 124 metres and struck the Basal Reef.

Gold continues to play a dynamic role, in both the history of Johannesburg and the history of South Africa. Working today at depths of nearly 4 km, man's resources and skills are continually called upon in the search and production of that metal which has aptly given South Africa the name of the treasure trove of the world.