

A History of Silver Mining in the greater Pretoria region, 1885-1999

by

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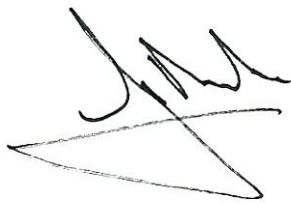
February 2012

Declaration of Authorship

I declare that

A History of Silver Mining in the greater Pretoria region, 1885-1999

is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

A handwritten signature in black ink, consisting of a series of loops and a long horizontal stroke at the bottom.

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signed

(Mr)

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SUMMARY

The mining of silver, although not as significant as the mining of gold, has a history of money being made and lost, as well as instances of fraud and theft.

In the late 1880s, when silver and lead deposits were discovered 100 km south-east of Pretoria, the Barnato family was quick to invest and float a company to exploit the deposit. To the north of Pretoria, Alois Nellmapius, later famous as the founder of the Hatherly distillery, established a company to mine a silver and copper rich deposit. The Strubens, pioneers of the Witwatersrand gold fields, discovered a silver rich copper deposit on their farm 'The Willows' east of Pretoria.

The successful silver mining companies listed on the Stock Exchange in Johannesburg soon attracted the attention of the Randlords of Johannesburg and specifically that of H Eckstein & Co. The development of the company's activities in silver mining in the 1880s and 1890s forms a significant part of this study.

The relationship between the mine owners and their managers during the nineteenth century is explored, along with local and international events in politics and economics that had an impact on the mining of silver in South Africa over the period from 1885 to 1999.

Silver mining in South Africa has had a 'rise and fall' life from the 1880s with three significant periods of investment, mining activity and decline. As with most commodities, prices vary over time. The international metals market has been a dominant factor in the life of the silver mines of greater Pretoria. The relationship between rising and falling international metal prices, and the operating lives of the mines, form a theme throughout this dissertation as it will be shown that the operating periods all coincided with periods of strong metal prices. In the one hundred and fourteen years, coupled with large tonnages of base metals – lead, copper and zinc - the mines produced over ninety-three tons of silver.

Over thirty silver mines and ventures were revealed during the research, but discussing all of them in this dissertation was not feasible. It is therefore limited to the history of the seven mines that produced the greatest amounts of silver and other metals such as lead, copper and zinc and how their individual and interrelated histories together form the dominant part of the history of silver mining in the greater Pretoria region.

Graham Reeks

February 2012

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QUOTATIONS

These quotations are personal inspirations.

“The silver industry promises to be a very good thing and it will be advisable to take influential friends in with us”.¹

Lionel Phillips Chairman of Transvaal Silver Mines Ltd in a letter to A. Beit in London dated 23 May 1891 in which he was discussing the development of the Argent mines and clearly expected silver mining to become a major producer of revenue.

Perhaps the most personal and poignant quotation for this dissertation

In the Gold Fields ‘*Argent Project FSJ de Jager’s reports*’ file, de Jager comments on the attachment of the 1920s technical advisors and mine manager’s reports of the Transvaal Silver & Base Metal mine to his 1989 final reports on the geology of the various Argent deposits.²

“To have summarised these very interesting reports, would have meant detracting from their intrinsic worth. They are therefore presented as is, for the serious student of the Argent base metal deposits.”

Having met Dr de Jager a few years before he passed away, I take to heart his comment and thank him for his foresight, that one day they would be used to reconstruct the history of the silver mines.

Because of the interdisciplinary approach of this dissertation - using historical documents, photographs, archaeological excavations and analysis of artefacts - to arrive at a history of the silver mining industry of the greater Pretoria region, a quotation by a very famous American historical archaeologist discussing the value of the written record is most appropriate.

“This is not to say that we can learn all there is to know just from studying the written record. If this were so, there would be no need to dig into the ground, or to sort, measure and classify artefacts.”³

¹ Archives of H Eckstein & Co Ltd. Volume HE 149, p. 663, May 23 1891.

² File ARG820/1/2 LEA-ZIN de JAGER – Argent Project FSJ de Jager’s Reports 1989, entry 5, ‘A report on the structure and possible remaining economic potential of the main vein - enclosure 3, Extracts from the monthly reports by the Technical Advisor, Jan1923-Oct 1925’, 20 April 1989.

³ J Deetz, *In Small Things Forgotten – An Archaeology of Early American Life*, p.11.

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GLOSSARY OF ACRONYMS

Acronyms, which appear in the text and footnotes

| | |
|------------------|--|
| AGM | Annual General Meeting |
| ALZ | Argent Lead and Zinc Ltd |
| ERPM | East Rand Proprietary Mines Ltd |
| GPS | Global Positioning Satellite |
| HE | H Eckstein & Co Archives |
| JPL | Johannesburg Public Library |
| JCI | Johannesburg Consolidated Investments Co Ltd |
| NASA | National Archives of South Africa |
| NAREF | National Photographic Archive |
| NLSA | National Library of South Africa |
| NZASM | Nederlandsch Zuid-Afrikaansche Spoorwegmaatschappij |
| PSL | Pretoria Silver Lead Co Ltd |
| SAMINDABA | South African Mineral Database |
| SAMEJ | South African Mining Engineering Journal |
| SS | (Staatsekretaris) Secretary of State of the ZAR |
| TAB | National Archive Repository of the National Archives of South Africa |
| TMA | Transvaal Miners Association |
| TPD | Transvaal Supreme Court |
| TSBM | Transvaal Silver and Base Metals Ltd |
| TSM | Transvaal Silver Mines Ltd |
| USA/US | United States of America / United States |
| UNISA | University of South Africa |
| ZAR | Zuid-Afrikaansche Republiek also known as the South African Republic |
| ZTPD | ZAR (Hooggerechtshof) |

MEASUREMENTS AND CURRENCIES

Where direct quotations are included in the text and they mention measurements in ounces, and or feet, they have not been converted to grams, kilograms or metres or appended in brackets in the quote, as it is felt that this detracts from the flow of the original quotation. In all other cases within the text the use of the metric units has been made. Generally distances are given in metres or kilometres and are indicated by (m or km). Mass units are indicated as (g) for grams or (kg) for kilograms. A table is inserted as Appendix 8 with a scale of direct conversions for the convenience of the reader.

The currency in general use during most of the mining activities was the Pound Sterling (£). The currency has been retained and not converted into Rands, or converted to the modern purchasing equivalent. During the period from 1885 to 2011 the value of the Pound has changed dramatically. A Pound in 1890 was worth about 60 times more than it was in 2011. The variations in the historical value of the Pound compared to the value of the modern value of the Pound are shown in graphic form in Appendix 9.⁴

TECHNICAL TERMS

As the subject matter of the dissertation is the history of a mining industry – silver, it is necessary to make use of certain mining terms along with discussing or mentioning machinery terms. Rather than continually referencing these terms, either in the body of the text or making use of footnote explanations, the terms are consolidated and explained in Appendix 1. Some terms are explained in footnotes where a simple explanation can be made.

BIBLIOGRAPHIC NOTES

Extensive use has been made of extracts from the letters of Hermann Eckstein, JB Taylor, Lionel Phillips and Alfred Beit in the volumes of letter books of H Eckstein & Co Archives. The citation in the footnote puts the page number before the date as the reference would be found in the order of volume number – page number – date of letter.

⁴ <http://www.nationalarchives.gov.uk/currency/results1.asp#mid> this site enables one to calculate the past value of a pound sterling in relation to its value in year 2005. Unfortunately the conversion factors only go as far as 2005.

During the creation of the database it was also found that it was easier to catalogue the copies of documents by date order and so by placing the date last it is easier to find a particular letter.

In the nineteenth century, businesses adopted a method of retaining carbon copies of outgoing letters. A book of 100 pages, where the upper original was perforated along the binding side, was produced. By the use of carbon paper, as the writer wrote a letter, a copy was made on a bound page. In essence each book or volume then contained the letters of a given period of time. The name 'letter books' is a shortened version of the full name which is 'letter press copy books.' Within H Eckstein & Co files are the letter books of each partner and they were often marked personal letters or company correspondence or specific sub-groups and with the time period. During the weeks spent researching H Eckstein & Co Archives, use was made of the excellent guide to the collection.⁵

ABBREVIATIONS

The use of abbreviations has been kept to a minimum. Use of Co for Company and Ltd for Limited has been made, but all other abbreviations are either listed on page vii or the name is used in full once and then followed with the abbreviation in brackets as (hereafter). For clarity of the text, no full stops are used between the initials of a name of individuals or after the abbreviations Co and Ltd for Company or Limited. The one exception is for volume in the footnotes and bibliography which is shown abbreviated to (Vol.) with a full stop before the respective number. Reference to one of the sources *The South African Mining and Engineering Journal* in the footnotes and bibliography has been shortened by abbreviating South Africa to SA. All other sources are presented in full name.

In the text, references are made to various mining company names or mine names that do not conform to the list of acronyms above or the names listed in Table 1. When referring to a mine, and to make the text flow more easily it was decided to use an abbreviated version of the company name or mine name, but in leading capitals. Thus

⁵ M Fraser, *Inventory of the Archives of H Eckstein & Co 1887-1910*.

the Transvaal Silver Mines Ltd becomes Transvaal mine or The Willows Copper (Argentiferous) Syndicate Ltd becomes the Willows mine. The assumption is that all mines mentioned were producers of silver as well as other metals. The only exception to this is if a gold mine is mentioned. This avoids repetition of acronyms and/or the full company name many of which do not have the word 'silver' or 'mine' in them. Only when discussing the company is the full name used.

EARLY NEWSPAPERS IN JOHANNESBURG

Many of the sources are from the newspapers of the 1880s and 1890s. A problem arises from the name changes that took place. In the 1880s there were two dominant newspapers. They were *The Standard and Transvaal Mining Chronicle* and the *Diggers' News and Witwatersrand Advertiser*. The latter newspaper was sold to the public as the *Diggers' News*. In 1890 the two newspapers merged to form the *Standard and Diggers' News and Witwatersrand Advertiser*. Although some copies were sold with the full name, within a short period of time the newspaper changed its selling name again, to the *Standard and Diggers' News*. In 1891 it became the official mouthpiece of the government of the ZAR and official notices in Dutch were gazetted through the newspaper. It also became anti-capitalist, with negative reporting on the mine owners and Randlords.

PREFACE

The subject of this dissertation is the history of silver mining in the greater Pretoria region between 1885 and 1999 – refer to the Map 1 on page xvi for a visual guide to the geographical area that is termed the ‘greater Pretoria region’. No comprehensive history on the subject has ever been written and before in-depth research was begun only a very basic background history of one or two of the mines was in the public domain. Some sketchy historical material had been included in publications of the Geological Survey of South Africa, (now Council of Geoscience).⁶ In 1975 known information about one of the mines –Transvaal mine (Argent main mine) – was included in a mineralogical article for a Johannesburg-Pretoria based mineral specimen collecting society.⁷

The principle aim of the research for the dissertation was to develop as full a history as possible of the development of the silver mines, along with the people involved with the mines. Questions explored and answered are who developed silver mining in the region and why? What was the role played by the Randlords in the late nineteenth and early twentieth centuries? What was the impact of politics and economics on the mining of silver and to what extent was the mining of silver in the region governed by the international price of silver and associated metals? The research revealed a significantly greater number of silver mines, ventures, prospects and more information than was thought to exist. Inclusion of the full results in this dissertation was not possible due to space constraints and this is discussed in more detail below.

Historically there has always been a demand for silver, both as a currency and for jewellery. There was a market for silver in the manufacture of household items such as cutlery, dinner service vessels, coupled with jewellery and the new photographic industry of the 1890s, but this was small by comparison to the currency demands. Silver, along with gold, had been used as a currency for much of the nineteenth century, in Europe and the United States of America. By 1873 England, Germany, Holland and

⁶ J Willemse, et al., *Lead Deposits in the Union of South Africa and South West Africa with some notes on associated ores*. See also PH Vermeulen, (ed), *The Mineral Resources of the Union of South Africa*, 4th edition. pp. 171-172.

⁷ G Reeks, ‘Field Outing – 23 February 1975’, *Micro News and Views*, Vol. 1, no 3 (1975), p. 1. The South Africa Micromount Society (SAMS) is a body of mineral specimen collectors who visit mineralogical sites and collect very small and often microscopic mineral samples. *Micro News and Views* is the journal of the society.

America had demonetised silver, with America briefly remonetising silver again in 1893. The politics that influenced the international silver market, especially in the latter half of the nineteenth century and its impact on the world market price of silver is discussed. The most detailed and documented history of the Pretoria silver mines occurred between 1885 and 1927. Local and international political and economic events relevant to the silver mines during that period are examined, paying particular attention to the vagaries of the international metal market for silver and lead. It was decided to restrict the discussion to those mines where records of production existed and significant quantities of silver were produced. These mines had the most interesting and complex histories; they operated and closed, due principally to the fluctuating prices of silver and associated base metals. The mines discussed are the Albert mine, The Willows mine, the 'Edendale mines', and the four mines at Argent, the 'Argent mines'.⁸

It was hoped to develop a history of the underclass's involved on the mines. Unfortunately - as so often happens - the people who were employed to do the digging and mining have no history in terms of who they were and what became of them. In a few places - Willows and Argent mines - it has been possible to determine the number of whites and blacks employed and what their tasks were. It is clear that the mining industry in Johannesburg in the 1890s was one of a Marxian struggle with capitalism and the politics of a rising capitalist mining oligarchy against the dominant political forces of Afrikaner nationalism. Such a struggle is particularly noticeable in the pre-1900 period, but it can also be transposed to the later mining periods, especially the years 1919-1922 and the rise of white miner trade unionism. Thus, as McGuire & Paynter stated: "An awareness of the role that power relations and ideology played shaping the past societies is a post-processual contribution... in that it emphasises the struggles among different interest groups in society".⁹

In Africa, all silver occurs either in argentiferous lead or argentiferous copper deposits. Silver is naturally associated with sulphides of certain other metals such as lead, zinc or copper. When the ore contains 1% or more of silver, it is said to be argentiferous.¹⁰ The

⁸ The terms 'Edendale mines' and 'Argent mines' are generic names for mines that had many name changes over the time period. Details are discussed in the respective chapters.

⁹ R McGuire & R Paynter, *The Archaeology of Inequality*, p. 1.

¹⁰ PW Thrush, *A dictionary of mining, mineral and related terms*, p. 1014.

history of silver mining in South Africa is thus very closely aligned to the mining of the two base metals, lead and copper. At the height of the silver mining industry in the late nineteenth century, companies such as the Victoria Regina Silver & Copper Mining Co Ltd, Brakfontein Silver and Lead Ltd or Willows Copper (Argentiferous) Syndicate Ltd demonstrate this point. Having stated this, it is also true that not all lead and copper deposits contain silver in values high enough to make it economical to extract the silver. The text of this dissertation will often mention the term base metals, which by simple definition means the opposite of the noble or precious metals of gold, silver and the platinum group. In this dissertation the base metals commonly referred to are lead, copper, zinc and antimony.¹¹ In the Americas, silver is often, though not always, found in its native or semi-pure state and not mixed as a component part of base metal ores. In the case of the silver mines of the greater Pretoria region, silver was the primary product sought, even when base metals provided substantial additional sources of revenue from the mining operation.

Silver mining in the greater Pretoria region began in the 1880s, when prospectors discovered several deposits of copper and lead that on assay were found to contain high percentages of silver. Further prospecting in the region led to it being called the ‘Pretoria Silver Belt’, a phrase coined by an anonymous journalist for *The Standard and Diggers’ News* in 1889.¹² This term elegantly describes the general distribution of the mines, because they follow geological strata that trend from west to southeast – the beds of the Transvaal Supergroup. However, it is not the intention of this dissertation to bring geology into the text. It is a little known fact that a silver and base metal mining industry developed at the same time as the gold mining industry of the Witwatersrand.¹³

Gold mining and industrial growth in the 1890s on the Witwatersrand was primarily controlled by a few very wealthy and powerful men, who became known as the Randlords (a journalistic collective term for the mining magnates who had made their

¹¹ PW Thrush, *A dictionary of mining, mineral and related terms*, p. 84.

¹² ‘Old workings (pre-European) in Pretoria silver belt’, *Standard and Diggers’ News*, 14 May 1889.

¹³ An industry is described as an “...organised economic activity concerned with... processing of raw materials...” T. McLeod, (ed), *The New Collins English Dictionary of the English Language*, p. 574.

fortunes in the diamond mines of Kimberley and the gold fields of Barberton).¹⁴ It is, however, a misnomer to assume that their power finished with the advent of the Anglo-Boer War. It is true that the dominant forces of Rhodes, Beit, Eckstein and Barnato had died by the end of the Anglo-Boer War,¹⁵ but many of the Randlords would continue after the war and be friends or adversaries of the Milner administration and the Botha/Smuts governments. Some would turn to politics once again, and become Members of Parliament after 1907. Many - such as the Albu brothers, Lionel Phillips, Abe Bailey, Solly Joel and Sammy Marx - would continue controlling and guiding various industries after 1902, until they retired in the 1920s or 1930s. One of their chief personal objectives was to amass as great a wealth as possible, and in order to achieve this goal they were prepared to pursue any entrepreneurial activity that fulfilled this requirement. When silver deposits were discovered near Pretoria they were exploited both because of their potential monetary returns and silver's worthiness as a precious metal. Eckstein, Taylor, Phillips and Beit, along with the other Randlords, were the economic might of the 1880s and 1890s in Johannesburg and Pretoria.

It will emerge in the text how H Eckstein & Co. – also known as the Corner House Group – emerged to become the strongest company in the silver mining industry of the 1890s. In 1889 the firm of H Eckstein & Co built a new head office in Johannesburg, of bricks and concrete rather than wood, as were most of the other structures. It was built on the corner of Commissioner and Simmonds streets and as the power of the company grew, so did the value of statements being issued from the building on the 'corner' of a city block. Very soon use of the term 'Corner House' became the generic name for a group that would grow to control the richest gold mines, land investment companies, industrial enterprises and other mining ventures such as silver mining. Ironically the 'Corner House' was never the official name of the building or the group.

¹⁴ The original source for the term 'Randlords' has not been found, but it is believed to have been used as a derogatory term by the English press in London in describing the millionaire financiers of the South African gold mining industry in the 1890s. Still one of the best sources for biographies on many of the 'Randlords' is the 1985 book by Geoffrey Wheatcroft. *The Randlords: The Men who made South Africa*.

¹⁵ The term 'Anglo-Boer War' is used throughout this dissertation rather than the alternative term – '2nd South African War.'

Throughout the text of the dissertation the name H Eckstein & Co has been used and only in a few places, such as quotes, is the generic name of the ‘Corner House’ or ‘Corner House Group’ used synonymously.¹⁶

Initially not all relations between President Paul Kruger of the ZAR¹⁷ and the Randlords were antagonistic. Strong economic ties existed between H Eckstein & Co and Kruger. On at least two occasions H Eckstein & Co were approached by the government of the ZAR for financial assistance with national projects, and this relationship had its benefits for both parties. As the silver mines became one of the points of contention between Kruger and some of the economically powerful Randlords, the mining of silver became increasingly vulnerable to political and economic manipulation by the government of the ZAR. The bickering between certain Randlords and the Kruger Government was to contribute to the Jameson Raid and ultimately the Anglo-Boer War. These events and the development of white-miner trade unions in the early twentieth century and their direct impact on the silver mining industry (1922 strike) are discussed along with the inter-relationships of the three distinct time periods of mining – the 1890s, 1920s and 1950s - with only minor prospecting or tribute mining occurring between these periods.

A few who made money in diamonds, but certainly not to the level of the Randlords, were to settle in Pretoria or the young Johannesburg and found businesses that would be vital as support industries to gold and silver mining. They would mine coal, make steel, make or import machinery or act as agents for overseas bankers or stockbrokers and would also invest in silver mining. There were also the lesser investors, those who had small-scale money to invest – ‘the followers’ - who rushed to take up offers of new ventures like silver mining with the intention of making money. These investors either made money, or lost everything and faded into oblivion. The 1890s was an era of rush in and buy, then sell and take the profit - unfortunately many lost money in bad deals or potentially fraudulent schemes.

Another dimension that is explored in the dissertation is the relationship, in the late nineteenth century, between the Randlords and some of their managers. It was often the

¹⁶ AP Cartwright, *The Corner House – The Early History of Johannesburg*, pp. xv-xvi.

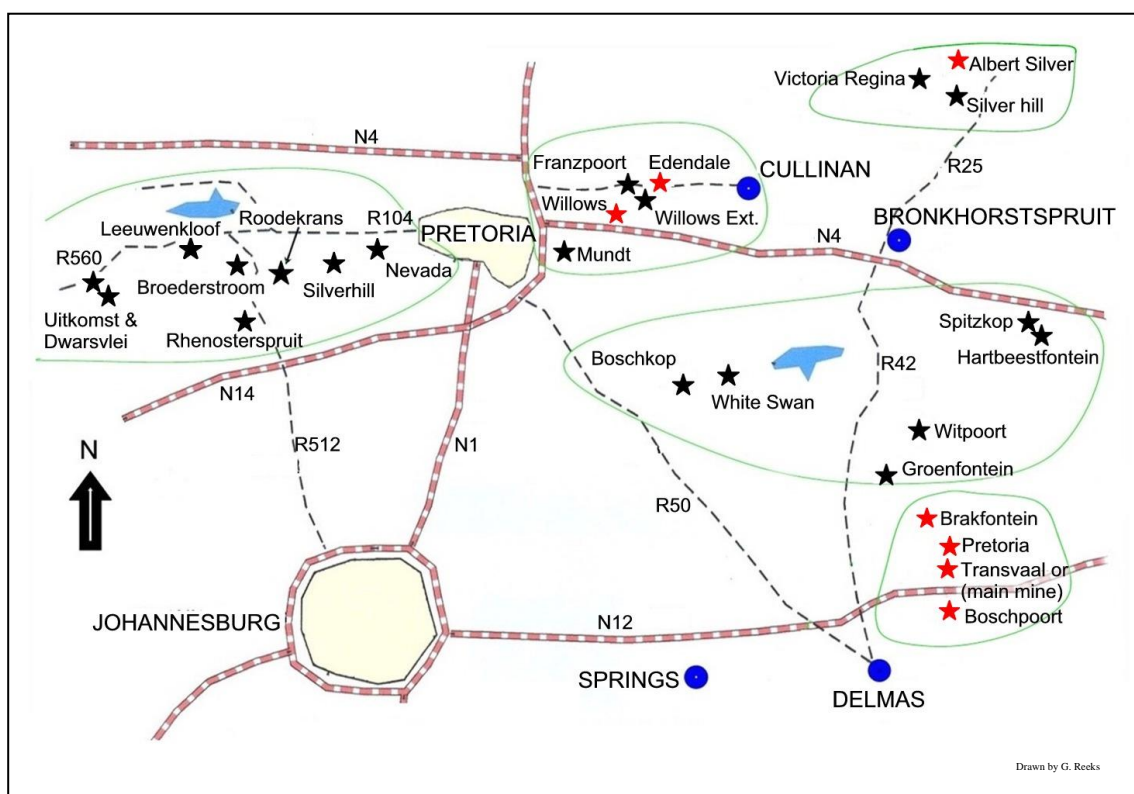
¹⁷ The terms ‘South African Republic’; ‘Zuid-Afrikaansche Republiek’ or the acronym ZAR are synonymous. In order that the reference is not confused with the modern ‘Republic of South Africa’ it has been decided to use the acronym ZAR throughout the text when referring to the former Republic.

Randlords who appointed the managers. In the correspondence of the Randlords, the managers were often referred to as 'he is the best in smelting silver lead deposits with 20 years experience' or 'he comes highly recommended as a mining engineer' [or manager]. This was true of Otto Hahn, the general manager at the Transvaal mine. The relationship between OJ Skill at the Willows mine and the partners of H Eckstein is one of particular interest, because it is shown that Skill had a secret agenda - aimed most likely at ultimate control or ownership of the mine. Entrepreneurs, like the Randlords, do not always make the best 'bosses', because what drives them is not the same spirit that drives their subordinates. This was certainly true of many of the Randlords and the people in the 1890s.

It was stated earlier that the research revealed over thirty individual mines or prospects existed during the time period covered by the dissertation. Records of more than fifty mining companies, who operated these mines, were found. Table 1 presents a list of all mines/prospects that were found during the archival research, as well as the farms on which the mines were located and the periods of operation. Although a history was compiled for all of the mines listed in the table not all of the smaller mines and their histories form part of the text of this dissertation. The majority of these small mines and prospects are located west and southeast of Pretoria. They featured in the rush to locate silver rich deposits in the 1890s and again in the early twentieth century. None were successful mines due mainly to the size of the deposits, lack of finance to operate the mines or financial returns to the owners/shareholders. The complete list of the mines or prospects - whether they ultimately operated as a mine or not, or if no records of production for them could be found - is included. This consolidated information is not available in any other publication. The research has demonstrated that the industry in its 114-year history produced conservatively 93 tons of silver, 31 000 tons of lead, 740 tons of copper and 3000 tons of zinc.

In most cases the mines were formed with one name that remained unchanged for the life of the mine. There were a few exceptions and the most complicated to follow, because of the multiple name changes, are the Edendale and Argent mines. In order to help ensure that the physical mine under discussion or research is the same, the name of the mine has been linked with the farm name and number. In the 1890s and 1920s there were instances where two or more mining companies were operating separate mines, but on the same

farm. For example, in the 1920s the Pretoria Silver Lead mine and the Transvaal Silver & Base Metals mine operated on the farm Dwarsfontein. The two chapters covering the development and history of the Argent mines discuss mines such as the Brakfontein or Boschpoort mine. Even though they are on different farms to the Transvaal mine, which is on the farm Dwarsfontein, in the 1880s and early 1890s they operated as separate mines. It was only as H Eckstein & Co gained control of the Transvaal mine that they merged their control with that of the other companies on the adjoining farms – these became the generic ‘Argent mines’.



Map 1. Showing the principal silver mines of the greater Pretoria region. The mines discussed in the text as major producers are indicated in red, all others are black.

The mines of the greater Pretoria region have been subdivided into five smaller geographical areas to facilitate an easier understanding of the spacial relationship of the mines to each other and to Pretoria. The list below - Table 1 - reflects the nominal five areas, and Map 1 above, illustrates these areas with a green line.

Table 1 – SILVER MINES AND OPERATING COMPANIES OF THE GREATER PRETORIA REGION, 1856-1999

The mines discussed in this dissertation are indicated in bold type. Those mentioned in the text but not discussed are italicised below in bold. The farm names are the current registered names. The years in the right-hand column represent the operating periods.

PRETORIA NORTHEAST AREA

| | | |
|---|---------------------|-------------|
| Albert (Silver) Mine Ltd | Roodepoortje 250 JR | 1885 - 1892 |
| <i>Victoria Regina Silver & Copper Mining Co Ltd</i> (South African Silver Mines Estate Co Ltd) | Roodepoortje 250 JR | 1887 - 1892 |
| | Zustershoek 246 JR | 1892 |
| | Leeuwfontein 248 JR | 1892 |
| | Wolengaten 250 JR | 1892 |
| | Welverdiend 249 JR | 1892 |
| <i>Silver Hill Mining and Developing Syndicate</i> | Silver Hill 253 JR | 1889 - 1914 |

PRETORIA WEST AREA

| | | |
|---|------------------------|----------------|
| Uitkomst Developing Syndicate | Uitkomst 499 JQ | 1889 |
| The Dwarsvlei Syndicate | Dwarsvlei 503 JQ | 1888 - unknown |
| Rhenosterspruit mine | Rhenosterspruit 495 JQ | 1890s & 1940 |
| Nevada Silver and Smelting Company Ltd | Mooiplaats 524 JQ | 1888 - 1892 |
| Broederstroom mine | Broederstroom 481 JQ | 1856 - 1860 |
| Broederstroom Lead & Silver Mining Syndicate | Broederstroom 481 JQ | 1907 - 1908 |
| Broederstroom Galena Prospecting | Broederstroom 481 JQ | 1916 |
| <i>Transvaal Silver & Lead Mines Ltd</i> | Roodekrans 492 JQ | 1906 - 1907 |
| | Hennops River 489 JQ | 1906 - 1907 |
| Premier Silver-Lead Mine | Roodekrans 492 JQ | 1907 |
| | Hennops River 489 JQ | 1907 |
| Unnamed company | Doornrandje 386 JR | 1907 - 1908 |
| Silver Hill Mining Co | Doornrandje 386 JR | 1967 |
| Leeuwenkloof mine | Leeuwenkloof 480JQ | 1907 - 1908 |
| | | 1913 - 1925 |

PRETORIA SOUTHEAST AREA

| | | |
|--|---------------------------|--------------------|
| <i>White Swan Argentiferous Co Ltd</i> | Oudezwanskraal 542 JR | 1886 - 1891 |
| <i>Transvaal Silver and Base Metals Ltd</i> | ditto | 1919 - 1920 |
| <i>Gold Fields of South Africa Co Ltd</i> | ditto | 1955 & 1977 |
| Boschkop Silver Mines Ltd | Boschkop 543 JR | 1891 & 1905 - 1908 |
| Unnamed company | Eensaamheid 534 JR | 1891 & 1924 |
| H Eckstein & Co | Schoongezicht 225 JR | 1891 |
| <i>H Eckstein & Co</i> | Groenfontein 206 IR | 1890 - 1891 |
| Unnamed company | ditto | 1923 |
| <i>Gold Fields of South Africa Co Ltd</i> | ditto | 1974 - 1976 |
| H Eckstein & Co (Rondevlei Silver Prospect) | Rondevlei 208 JR | 1891 |
| <i>Witpoortje Syndicate</i> | Witpoort 563 JR | 1889 - 1891 |
| Rand Eastern Developing Syndicate Ltd | ditto | 1903 - 1904 |
| Bronkhorst Lead and Silver Mines Ltd | ditto | 1920 |
| Transvaal Silver and Base Metals Co Ltd | ditto | 1920 |
| H Eckstein & Co | Haartebeestfontein 537 JR | 1891 |
| | Spitzkop 533 JR | 1891 |
| Great Western Chrome Co Ltd | Haartebeestfontein 537 JR | 1924 - 1925 |
| | Spitzkop 533 JR | 1924 - 1925 |
| Spitzkop Prospecting and Developing Syndicate | Haartebeestfontein 537 JR | 1928 |
| | Spitzkop 533 JR | 1928 |

PRETORIA EAST AREA

| | | |
|---|----------------------------|--------------------|
| The Willows Copper (Argentiferous) Syndicate Ltd | The Willows 340 JR | 1884 - 1893 & 1907 |
| Willows Extension Silver Mine Syndicate Ltd | Hatherly | 1889 - 1893 |
| Mundt Silver Mining Prospecting & Developing Syndicate | (old Haartebeestpoort 304) | 1889 |
| Franzpoort mine | Franspoort 332JR | 1890 - 1898 |
| Edendale Lead Mines Syndicate | Nooitgedacht 333 JR | 1894 - 1905 |
| Edendale Estates Ltd | Nooitgedacht 333 JR | 1903 - 1909 |
| Donerhoyul Tributing Syndicate Ltd | Nooitgedacht 333 JR | 1911 - 1914 |
| Edendale Inspection Syndicate | Nooitgedacht 333 JR | 1918 - 1919 |
| Edendale Developing Syndicate Ltd | Nooitgedacht 333 JR | 1920 - 1923 |
| The Edendale Lead and Zinc Co Ltd | Nooitgedacht 333 JR | 1935 - 1937 |
| Union Lead Mine | Nooitgedacht 333 JR | 1937 - 1938 |
| Union Silver and Lead Mines Ltd | Nooitgedacht 333 JR | 1938 - 1941 |
| Edendale Lead Mines (Pty) Ltd | Nooitgedacht 333 JR | 1949 - 1974 |

PRETORIA FAR SOUTHEAST AREA - ARGENT MINES

| | | |
|---|---------------------|----------------|
| Transvaal Silver Mines Ltd | Dwarsfontein 209 IR | 1889 - 1910 |
| Witpoortje Syndicate Ltd | Boschpoort 211 IR | 1891 - 1909 |
| | Brakfontein 559 JR | 1891 - 1909 |
| | Witpoort 563 JR | 1891 - unknown |
| Brakfontein Silver and Lead Syndicate Ltd | Brakfontein 559 JR | 1906 - 1907 |
| Boschpoort Silver Mining Syndicate | Boschpoort 211 IR | 1907 - 1909 |
| African Farms Ltd | Boschpoort 211 IR | 1909 - unknown |
| Transvaal Silver Mines Tribute Syndicate Ltd | Boschpoort 211 IR | 1908 |
| Rhenoster Mines Ltd | Dwarsfontein 209 IR | 1908 - 1909 |
| Dwarsfontein Galena | Dwarsfontein 209 IR | 1919 |
| Transvaal Silver and Base Metals Ltd | Dwarsfontein 209 IR | 1919 - 1927 |
| Pretoria Silver Lead Mines Ltd | Dwarsfontein 209 IR | 1920 - 1926 |
| New Pretoria Silver Lead Mines Co Ltd | Dwarsfontein 209 IR | 1926 - 1929 |
| Transvaal Galena (Pty) Ltd | Dwarsfontein 209 IR | 1940 - 1947 |
| Boschpoort Lead Mine Ltd | Boschpoort 211 IR | 1951 - 1954 |
| Argent Lead and Zinc Mines Ltd | Dwarsfontein 209 IR | 1952 - 1999 |
| | Brakfontein 559 JR | 1952 - 1999 |
| OTR Mining Ltd | Dwarsfontein 209 IR | 1999 |
| | Brakfontein 559 JR | 1999 |

References to the Transvaal mine in the text are synonymous with the ‘main mine’ on the farm Dwarsfontein 209 IR. It has been decided to use the generic term Transvaal mine throughout. However, in the 1920s it was also referred to as the ‘Argent main mine’ or ‘main mine’ in order to differentiate it from the other Argent mines operated by TSBM. Use of such references is retained in the text for that period. In the one hundred and fourteen year period it has operated as the Transvaal Silver Mines Ltd, Transvaal Silver and Base Metals Ltd, Dwarsfontein Galena and Argent Lead and Zinc Mines Ltd. References to the Edendale mine in chapter 2 generally refers to both the number 1 and 2 mines at Edendale.

SOURCES

Due to the myriad of sources available and the extensive research engaged in for this dissertation, the origins of the sources are discussed in some depth. The initial research began about fifteen years ago whilst researching literature sources for potential new mineral collecting sites as a backup to the author's hobby of mineralogy. It was realised that many of the Pretoria mines had interesting histories and when it became available, such information was collected.

Two of the most exciting archival finds made during the research were the finding of the originals of the 1890s mine engineer's reports in the Harold Strange Library and originals of the reports and proceedings of the 2nd to the 6th Annual General Meetings of shareholders to The Transvaal Silver Mines Ltd. in the Barlow Rand Archives. The Barlow Rand Archives houses the volumes of documents of H Eckstein & Co Archives. They also hold plans of the Transvaal mine (Transvaal Silver Mines Ltd), both - surface and underground - for the years 1890 and 1892. It was these two plans that formed part of the archaeological research and which were used in creating the predictive model for locating the 1890s buildings. The unpublished letter books of Lionel Phillips presented the most interesting daily information on the Argent mines, its people, as well as many of the details of the political struggles between Kruger and the Randlords. The letter books of another of Eckstein's partners, JB Taylor, gave much of the background and daily information on the Willows mine. Some of the handwriting, especially that of Alfred Beit, was extremely difficult to read and the transcription of his letters took many weeks. Also held in H Eckstein & Co Archives are originals of the annual reports of the 1890s Transvaal Silver Mines Ltd, (Transvaal mine), and these gave valuable information on the development of the mine, the equipment used on the mine and details of the staff.

Of the secondary sources, the biographies or memoirs of the Barnato family, the Struben Brothers, Alfred Beit, Lionel Phillips, JB Taylor, Alois Nellmapius and Hermann Eckstein, were the most useful. AP Cartwright deals with the development of the Corner House Mining Group in his book *The Corner House*. JDF Jones, in his book *Through Fortress and Rock*, presents one of the few detailed sources for the Albu brothers and General Mining and Finance Corporation.

Mining companies such as Gold Fields of South Africa (hereafter Gold Fields), General Mining and Anglo American Corporation were approached very early in the research period. Original documents of the New Consolidated Gold Fields of South Africa Ltd were lent for review and with subsequent permission, copied in full. These documents proved invaluable in the research as they included files of the 1920s Transvaal Silver and Base Metals Company which were transferred from General Mining to Gold Fields along with the mining leases. On reading through the files, it was exciting to find they contained extracts of the “Technical Advisors” reports for the period January 1923 to October 1925, and included the correspondence and decisions taken by Gold Fields on its mining operation in the 1950s and 1970s. An insight into the history of the mines during these periods was gained as the reports contain valuable historical, mining, geological, and exploration details. Had the files not been obtained, it would have been impossible to complete the history of silver mining in the greater Pretoria region, especially on some aspects of the 1920s and most importantly for the period of the 1950s.

When Gold Fields was re-approached in 2009 for information on another of their old mines (not connected with silver) the reply was that following the restructuring of the Gold Fields Company in the 1990s a corporate decision was made for all files dealing with old and abandoned mines and claims to be destroyed and this included the Argent files. One has to ask what valuable historical information for researchers was destroyed and why was it not offered to an archive?

Newspapers and mining journals were also a major source, especially for details of the lesser mining ventures or proposed ventures in the 1890s. The Audio Visual Library of UNISA has a collection of the *Standard and Diggers' News* from 1889 – 1899 on microfilm. The National Library in Pretoria has a set of *The Transvaal Mining Argus* from 1887 – 1907. Copies from 1887 – 1897 were reviewed. One of the most important sources for photographic evidence, as well as text, was the *Mining and Engineering Journal*. The journal has changed its name several times since its inception in the early 1890s, although it is still published as *The South African Mining and Engineering Journal* (SAMEJ). No single archive has a complete set and it was necessary to visit both the Johannesburg Public Library and the Library of the Council of Geoscience to review all the copies. As no index to the journal exists, one has to page through each

issue of the journal dating from 1891-1958 in order to find references (approximately 250 000 pages).

The National Archives of South Africa in Pretoria was the major source for official reports and correspondence from the State Secretary of the ZAR, court case files of the ZAR, papers of the Government Mining Engineer and the Secretary of Mines. The War Claims Commission files of 1902-03 provided the intriguing data on the damage to the Transvaal mine caused during the Anglo-Boer War and most importantly the four photographs of some of the 1890s buildings.

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From my undergraduate days and working on my other major; namely archaeology, I have been involved with the Archaeology Division of the Department of Anthropology and Archaeology. I have enjoyed a close relationship with the department's staff and would like to take this opportunity of thanking Professor Boeyens for not only allowing me to lead teams of students over the years at various excavation sites, but also for involving me in presenting lectures in the evening during the field school weeks, which enabled me to further explore and merge my interests in both archaeology and geology. I would also like to take the opportunity of thanking him for appointing me as a contract lecturer for one year in his department and for his encouragement in my geo-archaeological work at various sites. I hope that my geological/mineralogical knowledge has helped the department. I know that over the years I have created an interest in geology for some of my fellow students.

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At Barlows head office in Sandton I must first thank Annelie Kriel, who was my first contact and arranged for me to gain access to the H Eckstein & Co Archives although technically they were closed to access, and then Julia Woolcott, the Legal Librarian who helped me source the files. Although no longer at the Barlow Rand Archives I would like to mention the help I received in the late 1990s, from the then archivist Maryna Fraser. When I began my research into the involvement of H Eckstein & Co with silver mining in the 1890s, she was very encouraging and allowed me access to the files outside of the normal time window for researchers.

I was able to find a few references to the old silver mines near Pretoria in two newspapers of the period 1880-1890s, and I would like to thank Mr Mafedi Bepla and Miss Zine Sapula of the South African National Library in Pretoria who assisted me with searches. Over the years various members of staff at the National Archives of South Africa, Pretoria, have helped me with searches.

For many years the landowner and farmer Mr JJJ (Koos) van Rensburg on the farm Dwarsfontein near Delmas on which the 'Transvaal mine' is situated has always readily allowed me access to search for mineral specimens and to carry out the archaeological excavations that form part of this study. I thank him most sincerely for his kindness shown to me.

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Chapter 1

THE SILVER INDUSTRY OF PRETORIA - ECONOMICS AND POLITICS

The mining of any commodity does not occur in a vacuum – both political and economic events bring pressures to bear on such industries. Events can be local or international, and they can promote, depress or destroy the industries. The mining of silver in the greater Pretoria region experienced all of these factors during its history from 1885 to 1999. One of these dimensions in the late nineteenth century history of the silver mines was the political situation in the ZAR, or more simply, the relationship between President Paul Kruger and the principle owners of the silver mines, the Randlords. At the heart of the dispute was what Kruger and the Republic could gain from silver, counterpoised with what political and economic profits the Randlords could make from the mining of silver. The other significant dimension is the economics of silver as a metal on the international markets and its place in the world economy and how it was impacted by world economic and political events.

In order to contextualise the development of silver mining in the greater Pretoria region in the 1880s, an understanding of the state of flux in the world silver market at the time is necessary. During the late nineteenth century the international rush to mine gold on the Witwatersrand was matched by an equal and - in some places - greater emphasis to mine silver. Both metals held a demand, because both metals were recognised as the support base for many currencies such as the British pound and the US dollar. During the American Civil War, Lincoln had a serious problem of dwindling gold and silver reserves, and was faced with refusals by the European bankers for additional loans, unless at very high rates of interest. President Abraham Lincoln's solution was to print his own money, backed not by gold or silver, but faith in the Union government.¹ At the end of the American Civil War (1861–1865), the USA was virtually bankrupt and Britain, which controlled the international gold and banking market and to a very large extent the international industrial market, saw an opportunity to inflict severe economic pressure on America. By 1872 the American population was feeling the results of post-war recession. The threat to the small group of European bankers, who controlled world

¹ *History of Money* part 2 at <http://www.xat.org/xat/usury.html> (accessed on 03-09-2011).

finance, was the continued printing of paper currency by the USA without the support of gold and to a lesser extent silver.² Such a situation meant that they lost their control over the USA's demand for international borrowing and as such their potential for control and profit from the 'borrowing interest'. The European bankers - led by those in Britain - applied pressure through Congress to demonetise silver, so reducing the natural flow of money and forcing a return to a gold standard.

Silver was still mined in the USA, but the official ratio set by the US mint had become 16 to 1 or sixteen ounces of silver for one ounce of gold. This resulted in a situation where the mine owners could get more for their silver by selling it on the open market than to the US mint. The mint retaliated by suspending the purchase and coining of silver. By the late 1870s the price of silver had dropped so low that the official ratio of 16:1 was preferable to the open market price. Two pressure groups were to force a change in the legislation. Farming had developed in the 1870s and early 1880s to a point where overproduction had become a serious problem. The inability to sell the products economically because of oversupply gave rise to financial deflation, leaving many farmers facing large debts with a cheaper dollar. The silver mining companies, faced with falling value in the silver price, had continued mining and stockpiling their silver bullion in a hope that the price would rise again. When the price began to recover they flooded the market and drove the price down again to the point where, in many cases, it was below the cost of mining.³

By 1878, pressure on silver was so great that a new law was passed. Called the Bland-Allison Act, it allowed for the resuming of coinage of silver. In reality this never happened because the US Mint purchased silver bullion from the mines and stockpiled it, in effect quarantining the silver bullion. It helped a few of the major silver mines, but not the population of the USA.⁴ Both agriculture and the small to medium mines appealed to the US Congress for help and an inflation of the dollar, which would lead to a demand for money and an increase in the prices of farm and mined produce.

² Chief among them were the Rothschild family, which in the mid 1800s were estimated to control half of the world's worth through their European banking operations. *History of Money* part 2 at <http://www.xat.org/xat/usury.html> (accessed on 03-09-2011).

³ A Brinkley, *The Unfinished Nation – A Concise History of the American People*, pp. 527-529.

⁴ C Savoie, *Silver Wars and Silver Surprises*, p. 7.
At http://www.silver-investor.com/charlesavoire/cs_feb04.htm (accessed on 03-09-2011).

However, a major silver mine, the Nevada Comstock, did not raise too much of an issue with respect to the new Act – the reason being they were already a major seller to the US Mint and had been from 1875.⁵ The relatively weak response from Congress was the Sherman Purchase Act of 1890, under which the Federal Government was required to purchase 4.5 million ounces of silver every month with Treasury Notes that could be redeemed for gold. Naturally, as with many issues of government bonds, wary investors preferred the idea of hard gold to paper. The result was a significant reduction in the national gold reserves.⁶ In 1893, President Grover Cleveland was instrumental in repealing the Sherman Silver Purchase Act, but not before the ‘Panic of 1893’ had begun, which led to the collapse of some railroad companies unable to repay loans, followed by banks and thousands of businesses collapsing, leading to the first severe depression in the United States in 1893–1895.⁷

The international impact of these interrelated events, outlined above, was significant. The mining of silver and its price were in serious decline before 1885. Many large silver mines such as those in Mexico, (which was in revolutionary political turmoil), the Anaconda copper mine in Montana, USA, and the Cobalt mine in Ontario, Canada, had closed or were closing down. This was due to the downturn in the demand not only for silver, but also for lead, copper and cobalt. The Sherman Act of 1890 led to a recovery of the silver price and to a revival of interest in the mining of silver. This provided the new mining industry of South Africa with the impetus needed to create an opportunity to invest in silver mines. The period 1889–1890 was to witness a rise in silver mining ventures and prospects in South Africa with the Transvaal mine, the Albert mine and the Willows mine being the most prominent and certainly the most important at this time.

The fortunes of silver in South Africa were tightly interwoven with that of gold and so a reversal of gold’s economic might in Johannesburg would impact on silver. Gold’s reversals also impacted on other industries and investments. As with so many economic collapses, one event may be seen as a dominant cause, but associated or parallel - local or international - events may be equally responsible or progressively responsible for the

⁵ A Weinstein, *The Bonanza King Myth: Western Mine Owners and the Remonetisation of Silver*. *The Business History Review*, Vol. 42 No 2 pp. 195-218.

⁶ A Brinkley, *The Unfinished Nation – A Concise History of the American People*, pp. 527-529.

⁷ *Ibid.*, pp. 526-527.

collapse. This is true for the economic depression on the Witwatersrand in 1889–1892. The primary cause was believed to have been the change in the nature of the gold ore, when in reality this was only one problem. Other problems were shortages and high cost of labour on the Witwatersrand, collapse of one major international bank in London and three Cape Banks, reduction in venture capital from investors both local and overseas. This tangled web of events is discussed in more depth below.

In order to understand the economic collapse of the Witwatersrand in 1890, one has to look briefly at the main industry of the region - gold mining. The mining of gold had been a relatively easy and profitable process for the first few years of the industry, because the gold ore could be broken down (crushed) using simple stamp batteries. The resulting crushed rock was carried by water over mercury-coated plates, where the gold was attracted to the mercury and the resulting amalgam was collected and then smelted. In 1890 the mines had reached depths of 10-20 m, at which point the ore changed to an un-weathered conglomerate - which was a mixture of gold coupled with iron sulphides (mainly pyrite). The original beneficiation method became inadequate to extract the gold and many of the mines closed down. Share prices tumbled and bankruptcies followed, as individuals who had owned shares at £5, suddenly found that the shares were only worth 5 shillings.⁸ A share market that listed the thirty best shares in 1889 at nearly £25 million collapsed and valued them at just over £9 million in early 1890.⁹

This provides an explanation why so many of the small Pretoria silver mines appeared in 1889 only to close down by 1892. Venture capital was not readily available for an industry that was competing against a collapsed 'big brother' of gold mining. In 1890 Johannesburg's survival was in doubt and so investment was on hold. Van Onselen states how Johannesburg was founded on the hard work of the individual miner, but the crash of 1889 changed the dynamics of Johannesburg's mining community forever, from the self-employed small-scale miner/operator to wage-earning employees of the future mining houses.¹⁰

⁸ DJ van Zyl, *The Discovery of Wealth*, pp. 74-75,

⁹ The Economist 8 March 1890, quoted in M Fraser & A Jeeves, *All That Glittered – Selected Correspondence of Lionel Phillips 1890-1924*, p. 8. See also RV Kubicek, *Economic Imperialism in Theory and Practice - The case of South African Gold Mining Finance 1886-1914*, pp. 116-122.

¹⁰ C van Onselen, *Masked Raiders – Irish Banditry in Southern Africa 1880 - 1899*, pp. 40 – 41 and 164-165.

The problems associated with the economic recovery of the gold constituted only one of the financial problems to hit the Witwatersrand in 1889. Over-speculation in shares of mining companies or feverish trading in speculative or non-existent companies created a market whose 'bubble' had to burst. The shortages and rising cost of labour contributed to the economic problems of the mines. On the Witwatersrand, the economic exodus of the population was a significant factor. It is estimated that the European population fell from 25 000 inhabitants to approximately 17 000.¹¹ It was only in the middle of 1890 that the chemical recovery process, patented by a couple of Scottish chemists a few years before, was introduced onto the Witwatersrand. In 1891 the MacArthur-Forrest cyanide recovery process was generally adopted for the extracting of the gold from the pyritic gold reefs and the economic recovery of the Witwatersrand began.

Other major factors that impacted on the economic life of the Johannesburg mining industry were both local and international. In early 1890 the first event was the simultaneous financial collapse of three banks in the Cape - The Cape of Good Hope Bank, the Union Bank and the Paarl Bank - due primarily to over-exposure in the speculative share market.¹² Many of the Rand's financiers and brokers became insolvent overnight, because the banks held thousands of gold-mining shares against personal overdrafts. Edouard Lippert, once regarded as one of the Transvaal's most wealthy men, lost heavily. It was also believed that Barney Barnato lost nearly £3 million.¹³ A second event that was to impact on the investment in emerging markets - the gold mines of Johannesburg, and the silver mines of Pretoria in 1890 - was the collapse of Barings Bank in London. Barings was heavily involved in financing the development of the emerging Argentinean farming industry. It became over-extended and collapsed.¹⁴ The ripple impact was the withdrawal of European investors from emerging markets, which included Johannesburg.

¹¹ AP Cartwright, *The Corner House – The Early History of Johannesburg*, p. 95.

¹² M Fraser & A Jeeves, *All That Glittered – Selected Correspondence of Lionel Phillips 1890-1924*, p. 90, n16.

¹³ AP Cartwright, *The Corner House – The Early History of Johannesburg*, pp. 101-102.

¹⁴ M Fraser & A Jeeves, *All That Glittered – Selected Correspondence of Lionel Phillips 1890-1924*, p. 90, n16.

When the gold mining industry managed to overcome its technical difficulties of beneficiation, coupled with improved labour supplies, it managed to attract local and foreign investors back. In the years of recession many of the smaller gold mines had been incorporated into the mining groups such as Johannesburg Consolidated Investments (JCI) and H Eckstein & Co. The reinvestment in gold mining would not only help Johannesburg, but would also see a strengthening of the silver mining industry as the firm of H Eckstein & Co took a leading position in the control of the industry from 1890 - 1895.

Herman Eckstein and JB Taylor formed the investment and management company H Eckstein & Co in 1887 to manage the ZAR operations of London based Jules Porges & Co. In 1889, when Jules Porges retired, his partners Julius Werner and Alfred Beit restructured the company as Werner Beit & Co. The H Eckstein & Co's partners were junior partners in Werner Beit & Co and exercised investment both for themselves and on behalf of the London based partners and directors, with ultimate financial control coming from London. The partners decided that the company needed a permanent presence in Pretoria, close to the political and bureaucratic hub of the country. The reason for wanting to establish an office in Pretoria was to foster a strong relationship with Kruger who was the key to the political and economic structure of the ZAR in the 1890s. By establishing these ties, the partners hoped to be aware of, and if possible, forestall both political and economic decisions that would impact negatively on their silver or gold mining operations. As with all such plans the partners knew that such a relationship would need some form of repayment. This would ultimately require the partners to raise finance for two of Kruger's largest projects – the NZASM railway and the National Bank. Both of these projects are discussed below to illustrate the extent of financial commitment by the H Eckstein partners to Kruger's government.

As Taylor's family lived in Pretoria, it made sense for his office to be based there permanently, which came about in December 1890. Part of his duties was the management of various investments that the company had in the region, such as its investments in the Albert and Willows mines.¹⁵ Having been born in the Eastern Cape, Taylor was fluent in Dutch and this was an advantage over many of his rivals. When Taylor was a small boy he had known Kruger, and this relationship was put to good use

¹⁵ AP Cartwright, *The Corner House – The Early History of Johannesburg*, p. 114.

over the next four years, until JB Taylor retired from the firm in 1894.¹⁶ His greatest service to the company was in knowledge gathering at the seat of government. Taylor established friendly relations with Dr Leyds, the State Secretary, and he had connections at all levels of the political machine and was well aware of the various levels of corruption in the Government and Civil Service, even to Presidential level.

When Kruger tried to establish a State Bank, he initially gave a concession to a group of Hollanders.¹⁷ Unable to raise sufficient capital from merchant banks in Europe they approached Lippert – the ‘dynamite king’¹⁸ of the ZAR. Lippert was most definitely Kruger’s person of choice for the awarding of concessions, which is assuming that a Kruger family member was not on the list of choices. Ironically, Lippert was a cousin of Alfred Beit, yet the two were to remain on an antagonistic non-speaking relationship until Beit’s death in 1906. Beit and the other Randlords never forgave Lippert for his dynamite concession and the damage that it did to the economy of the mining industry. Although Lippert had many connections with merchant banking firms in London, he failed in this instance to raise the necessary investment capital for a State Bank.¹⁹

Undeterred, Kruger turned to his friend JB Taylor of H Eckstein & Co for assistance. Eckstein was having difficulties with some of the South African commercial banks at the time; there was reluctance on the part of the banks to finance new mining ventures. Eckstein and Taylor saw an opportunity to not only improve relations with the government of the Republic, but at the same time provide an additional source of finance to the company. The approval of the Wernher, Beit Company in London as the parent company of H Eckstein & Co was obtained and through the Wernher, Beit Company, doors to European banking firms were opened. In 1890 the Nationale Bank de Zuid-Afrikaansche Republiek Beperk was created with both the ZAR Treasury and the firm of H Eckstein & Co investing £100 000 each. Once the merchant banks of Europe became aware that the Wernher, Beit Company was involved in the creation of a State Bank, all reluctance to become part of the investment was overcome and they provided the balance

¹⁶ TS Emslie, (ed), *Lucky Jim – Memoirs of a Randlord by JB Taylor*, p. 45 & p. 116.

¹⁷ *Ibid.*, p. 124.

¹⁸ R Mendelsohn, *Sammy Marks – ‘The Uncrowned King of the Transvaal’*, p. 93.

¹⁹ AP Cartwright, *The Corner House – The Early History of Johannesburg*, p. 113.

of the £800 000 capital.²⁰ It was a condition of Herman Eckstein that for his firm to participate in the founding and management of the State Bank, Lippert was not to be a director of it. This condition was accepted and JB Taylor became a director of the bank and represented H Eckstein & Co, on the Board.²¹

An interesting aspect uncovered only in the letter books of H Eckstein & Co deals with the proposal by the ZAR Government to tax the silver mines on the same basis as the gold mines. At the beginning of April 1891, notice was served on the directors of the Albert mine to present arguments why their property should not be proclaimed as a public digging under the Gold Law. Dr Leyds explained to the directors that under the Gold Law companies had no right to mine their own properties unless they had mining leases. Dr Leyds advised the directors of the Albert mine to take out a Mijnpacht lease.²² The directors of H Eckstein & Co were obviously worried about losing their property and mining rights of the Willows and Argent farms to what would have been an open raid by prospectors to peg claims on the farms, thus yielding a higher return in individual mining licence revenue for the State.²³ The directors of the Albert mine and principally Nellmapius, a close friend not only of Kruger, but also JB Taylor, worked together to get the proposal on opening the silver diggings reversed. It appears that they were successful; however, the Government was still determined to tax the silver mining operations and further discussions were held.

On 21 April 1891 JB Taylor writes to Beit in London that Nellmapius dined with the President and discussed the proclamation on silver. The President declared that all minerals belonged to the State and therefore as mining for silver was taking place it was only fair that the State should receive some remuneration for the mining. Nellmapius reported that Kruger continued by stating if the proclamation was found to be premature

²⁰ AP Cartwright, *The Corner House – The early History of Johannesburg*, p. 113.

²¹ TS Emslie, (ed), *Lucky Jim – Memoirs of a Randlord by JB Taylor*, p. 125.

²² Mijnpacht lease or Mijnpachbrief - The ZAR Gold Law of 1885, provided that the proprietor of a farm upon which precious metals had been discovered, either by the proprietor himself, or a prospector, and who desired to possess the right for opening and working mines on such farm should furnish himself with a mining right lease (mijnpachbrief) from the Government. This lease gave him the right to mine a portion of the farm, the size of which is mentioned in the lease. J, Gray, *Payable Gold*, p. 62.

²³ Archives of H Eckstein & Co Ltd. Volume HE 190, pp. 106-107, 16 April 1891.

he would suggest to the Raad²⁴ that a fixed rate be levied on the silver extracted. Nellmapius thought such a rate would be about 1%.²⁵ Clearly the partners were concerned, because a few days later, Taylor wrote to Beit: “According to Law – Dr Leyds states the Government can claim 2½% on the mijnpacht dues.” Some discussion took place regarding the size of the mijnpacht for silver and lead mining and it was agreed that it should be set at 25% of the area of the farm, with the payment of Government mijnpacht dues then being the same as the Gold Law which was 10%.²⁶ Despite the imposition of a government levy or tax on an area of the farm or an amount of silver produced, the mining of silver was considered a profitable venture and this only changed when the international prices of lead and silver collapsed.

By the end of April 1891 Lionel Phillips in a letter to Beit writes: “Government talks of a royalty on silver. If this be moderate at say 2% I think it would answer our purpose better than proclamation, this of course depends upon what area of the farms will be productive.”²⁷ Through the Chamber of Mines, H Eckstein & Co approached the government to impose a duty on the output of silver and not put a tax on the farms. The argument was that silver, unlike gold, is sporadic in nature with rich spots in one part of the farm and nothing in other parts.²⁸ Clearly the government had other factors of more concern, because on 4 July Taylor wrote to Beit after discussions with Dr Leyds. Taylor stated that Leyds informed him that as the mines were working under the Gold Law, and it would require a revision of the Law to change it for silver, that the industry could continue its operations without fear of any proclamation of public diggings being imposed on them. It seems as if this was the final answer from Dr Leyds as it was not mentioned again in any later correspondence.²⁹ As H Eckstein & Co had benefitted from the amicable conclusion to taxation of the silver mines by the Kruger government, they were receptive to Kruger’s approaches for financial aid when the Nederlandsch Zuid-Afrikaansche Spoorwegmaatschappij (NZASM) railway company ran into difficulties.

²⁴ Raad was the name of the Parliament of the ZAR. It is unclear however if the reference is to the Raad, ie the Parliament or the Uitvoerende Raad meaning the Executive Council or the ZAR cabinet.

²⁵ Archives of H Eckstein & Co Ltd. Volume HE 190, pp. 106-107, 16 April 1891. See also pp. 120-121.

²⁶ *Ibid.*, pp. 129-130, 24 April 1891.

²⁷ Archives of H Eckstein & Co Ltd. Volume HE 149, p. 642, 24 April 1891.

²⁸ *Ibid.*, p. 654, 7 May 1891.

²⁹ Archives of H Eckstein & Co Ltd. Volume HE 190, p. 300, 4 July 1891.

The ZAR had since the days of President Thomas Burgers (1871–1877) desired to have its own railway connection to a port not under British control. This need to be import/export independent of any British port was to last right up until the latter part of the Presidency of Kruger, but was never to be fully realised in practice. Nothing tangible came of the plan until a concession was granted to a group of Dutch businessmen in 1887 that then formed the NZASM. The company was to build a railway line from the Mozambique border to Pretoria after, ironically, a British company had built the line from the port of Delagoa Bay (Maputo) to the ZAR border.³⁰

During the international financial crisis of 1890 in Europe, the NZASM found itself financially compromised and unable to continue with development of the railway line. An approach by Kruger to H Eckstein & Co for funds – pre-dating his approach to the Cape Government for financial aid – was discovered during archival research for this dissertation.³¹ It involved the utilisation once again of the relationship between Kruger and Dr Leyds with JB Taylor. Letters in the H Eckstein & Co Archives reveal the details of the financial deal which was immediately successful for the continued financing of the NZASM railway. A letter from JB Taylor to Beit in London declares that the syndicate has advanced £100 000 to the Railway Company (NZASM). The loan was expected to provide sufficient funds for the Railway Company to finish the line from the border to Nelspruit. In 1892 the NZASM Company was still in financial difficulty and Kruger was forced to seek further financial aid. The common belief is that Kruger's initial approach for financial aid was to the Cape Government. This is erroneous, as it was to H Eckstein & Co that Kruger first turned to for financial help.³²

It is clear from the research that along with the other Randlords the partners of the H Eckstein Company were not above trying to influence decisions at government level to suit themselves. Similarly many of the government officials within the ZAR, and this includes Kruger, were also involved in influencing decisions for personal reasons. Kruger appears to have directed the construction of the Delagoa Bay railway line away from the

³⁰ CFJ Muller, (ed), *500 Years – A History of South Africa*, pp. 281-282.

³¹ Archives of H Eckstein & Co Ltd. Volume HE 190, pp. 249-250, 17 June 1891 & pp. 273-274, 1 July 1891.

³² During the research a book was discovered in the UNISA Archives which presented many details on the construction of the NZASM railway: *Delagoa Bay Pretoria Railway, NZASM – official opening souvenir book*, (Pretoria: 1895). See also TRH Davenport, *South Africa – A Modern History*, pp. 203.

silver mines east of Pretoria and towards his own farms, as suggested by Lionel Phillips of H Eckstein & Co: “I understand the President has farms in the interest of which another route is desirable.” Although to be equally fair, Phillips in the same letter appears to hint at some form of bribery to get the railway line to pass close to the Willows mine when he states: “But have no doubt that £3000 or £4000 judiciously handled would bring the line past the Willows.”³³ Until the Jameson Raid both sides played each other for what they could benefit from the relationship.

Over the next four years there was a great deal of give and take from both the Kruger government and the Randlords. But politically inspired and driven Randlords such as Rhodes, Beit and Phillips, the latter two of whom were partners in H Eckstein & Co, were to alter the relationship with Kruger from one of mutual benefits to hostility. By 1894 relations had disintegrated and there was a rising desire to seize power from the Kruger government. A group of the Randlords formed the Reform Committee and plotted an armed intervention which became known as the Jameson Raid. It is not the intention to present a detailed study of the Jameson Raid and the men behind the Reform Committee as both have been more than adequately covered by the historians Elizabeth Longford³⁴ and Jane Carruthers *et al.*³⁵ However, a brief summary of events is given below in order to contextualise the information dealing with the ‘Reformers’ trial and its impact on the industries of the Witwatersrand and in particular silver mining. The impact of the Raid on the silver mining industry was not the Raid per se, but the removal of four of the six directors of the Transvaal Silver Mines Ltd who were also members of the Reform Committee.

It was a belief at the time of writing the dissertation proposal that the removal of the four directors was the primary cause for the closure of the Transvaal mine. Subsequent research has revealed it was the world crash of the silver market in 1893-4 that was the real cause for the closure of the silver mines of the greater Pretoria region. The collapse of the international silver market was caused by the repeal of the Sherman Act in 1893, followed by a severe, but short, economic depression in the United States. The repeal of the Sherman Act led to a decline in the demand for silver, which resulted in a falling

³³ Archives of H Eckstein & Co Ltd. Volume HE 149, pp. 249-250, 20 June 1891.

³⁴ E Longford, *Jameson's Raid – Prelude to the Boer War*.

³⁵ J Carruthers, (ed), *The Jameson Raid – a Centennial Retrospective*.

metal price, followed by further closures of silver mines - especially in Mexico. To many the repeal was seen as the death knell of silver as a metal worth mining. The final blow for the South African silver mines was falling prices for the associated lead and copper. By 1893 the political situation was beginning to change in the ZAR and by the time of the Jameson Raid, at the end of 1895, the prospects for successful mining of silver in South Africa were economically nil.³⁶

It is necessary to present a brief summary of the Raid and more importantly the Reform Committee in order to understand the impact the arrest and trial of the reformers had on the possible re-birth of silver mining in the late 1890s. As the gold fields of the Witwatersrand developed from 1887 to 1893, Britain realised that to control the ZAR was to control the world's major source of gold. Britain denied the ZAR access to the sea north of Natal by expanding Natal's territory until it reached the border with Mozambique. This action forced Kruger to use British controlled ports for imports and exports as the Delagoa line had not been completed. To do so meant having to pay the inflated rail tariffs either to Durban or the Cape ports. When financial constraints on the further development of the Delagoa Bay railway from Middelburg to Pretoria created problems for Kruger, the Cape Government offered loans, but with restrictive conditions. Realising that the stranglehold he wanted to apply was not going to work, Cecil Rhodes as Cape Prime Minister, began plotting a coup d'état to oust Kruger and gain political and economic control of the ZAR. The plan was to send a military force of seven hundred armed soldiers into the ZAR from the Bechuanaland (Botswana) rail line at Pitsani, led by a man who was to give his name to the Raid - Dr Leander Starr Jameson. They would ride in at the 'invitation' of the Reform Committee, in support of an Uitlander uprising.³⁷ In the end the Raid became a fiasco, with all of the raiders, apart from those killed by the Boer Commandos, being surrounded and captured.³⁸

The Reform Committee consisted of Randlords, wealthy businessmen, directors of many mining and trading companies and a few lawyers and brokers, along with some minor

³⁶ A Brinkley, *The Unfinished Nation – A Concise History of the American People*, pp. 527-528.

³⁷ "Uitlander – a term generally applied to non-ZAR citizens, especially those from Britain, America, Australia." BJ Liebenberg and SB Spies, (eds), *South Africa in the 20th Century*, p. 4.

³⁸ For a very good summary explanation of the politics and planning before and during the Raid, see T Cameron & SB Spies, *An Illustrated History of South Africa*, pp. 190-191.

participants who were more support staff than planners – 64 men in all.³⁹ Their role was to organise the armed uprising in Johannesburg, capture the State Armoury and the principle leaders in the ZAR government in Pretoria.

The imprisonment and subsequent trial of the ‘Reformers’ is also well covered in Elizabeth Longford’s book⁴⁰, but what is not generally covered in the sources is the fact that twenty-five members of the Reform Committee were directors of mining companies and some were directors of a large number of mining companies. Four of those arrested as conspirators were directors of Transvaal Silver Mines Ltd. They were Lionel Phillips (Chairman), George Farrar, Samuel W Jameson and HA Rogers. Phillips and Farrar were two of the four conspirators who were initially sentenced to death. The Jameson Raid and the subsequent trial of the Reform Committee members resulted in an almost complete breakdown of relations between the Kruger government, the Beit/Rhodes mining community, the Imperial Government and Joseph Chamberlain, the Colonial Secretary in London. This breakdown ultimately led to the Anglo-Boer War.

During the search for documents dealing with the men involved in the silver mining industry, one source was found which revealed the impact caused to industry as a whole in Johannesburg by the arrest of the members or supporters of the Reform Committee. The source lists the directors and the companies that they were involved with. The following is a summary of those who held directorial posts – with the number of companies in brackets - many of them being directors or shareholders in silver mining companies: Lionel Phillips (24), George Farrar (33), Solly Joel (30), HJ King and George Richards (17 each), HB Marshall (12), HA Rogers, SW Jameson & Abe Bailey (10 each), RG Fricker, JS Curtis, St John Carr, F Mosenthal, JA Roger, JH Hammond, JJ Lace, P Du Bois, Captain Mein (3 each), F Spencer and HC Hull (2 each), WHS Bell, Max Langermann, JM Buckland, Harold F Strange and Charles Butters (1 each).⁴¹

These men who formed the Reform Committee were, for a large part, the leaders of Johannesburg’s industries of gold, silver, coal, mining equipment, investment and land companies. All of these industries were affected; many companies lost enough directors,

³⁹ ‘Imprisoned Directors’, *The South African Mining Journal*, Vol. 5, (9 May 1896), pp. 617-618.

⁴⁰ E Longford, *Jameson’s Raid – Prelude to the Boer War*.

⁴¹ ‘Imprisoned Directors’, *The South African Mining Journal*, Vol. 5, (9 May 1896), pp. 617-618.

such that no signatories existed within a company. Twenty-two companies lost their chairman - a number lost managing directors or general managers. By May 1896 the press was stating how important it was for these men to return to Johannesburg immediately, as many businesses were being brought to a standstill. Of course with the benefit of hindsight one cannot condone the fact that their act was treason. After those on trial had been released many went back to running the companies that they had been involved with before the Jameson Raid. None of the silver mines could be re-opened, as all of them were victims of the collapsed international silver market following the repeal of the Sherman Act in the USA. The Argent mines, although not operational at this time still existed as mining companies, with the mines being looked after by caretakers.

In South Africa the last six years of the nineteenth century was a period when everyone in the ZAR knew that war between Britain and the Republics was inevitable - it was the timing that was the unknown. The Anglo-Boer War was to see almost all mining operations in the ZAR close down. Damage was done to a number of the mines around the Witwatersrand and outlying districts – the Transvaal mine at Argent was one of these mines. More reference is made to this, along with historical photographs which were used in the predictive archaeology research, in chapter 4.⁴²

Although there was relatively little significant silver mining activity in the period from 1900 to 1919, what did take place was prospecting and small operator mining of many of the silver deposits, especially those west of Pretoria. As they form only a small part of the history of silver mining in the region their story is not detailed in this dissertation. Recovery of the mining and commerce economy of the Witwatersrand was significantly impeded by the scarcity and cost of labour in the period after 1900. The post-war period to 1910 was to witness an attempt by the Randlords – who still existed, and still controlled mining and commerce – to continue their form of autocratic management as had existed before the Anglo-Boer War. To a large extent their principle appeared to be to keep both the European and black working class - the miners – in a situation of poor wages and poor working conditions. Due to the lack of documentary source material it has not been possible to study the part played by the black underclass in the silver mines.

⁴² G Reeks, 'Report on the Historical Archaeology Excavations of the Argent Silver Mine', unpublished excavation report submitted to South African Heritage Resources Agency (SAHRA).

The growth of European worker intransigence began with a significant labour strike in the gold mining industry in 1907 and the growth of industrial unrest would continue and culminate in 1922 with the most serious strike in South African history. In researching the history of the silver mining industry only two cases of industrial action by miners against silver mine management have been found in the sources – the 1922 strike at the Transvaal Silver and Base Metal Co Ltd mine and the Pretoria Silver Lead Co Ltd mine. Although the economic impact on the silver mining industry was small by comparison with the gold mines, there was industrial strike action on the mines and this will be explained in Chapter 4.

In trying to understand the background to the 1922 strike and its brief impact on the silver mines, it is necessary to put it in context with the earlier strikes that hit the Witwatersrand. A brief historical background to mining labour conditions and the rise of unionism from 1907 is provided. A recent book by Krikler presents the history of the various strikes leading up to the 1922 revolt.⁴³ Management of the gold mines was continually looking for opportunities to cut the rising cost of their operations. At the root of the problem was the high cost of employing skilled white miners, a large proportion of who were from Britain or Australia and had immigrated either during the 1890s or after the end of the Anglo-Boer War. Many of these miners were from Cornish tin mines, the coal mines of Wales, Scotland and England or the gold mines of Australia.⁴⁴

The depressed state of such mines in Britain, and the adverse conditions under which the miners worked, led to the development of strong socialist political affiliations amongst them. The miners were used to striking against oppressive managements, either for better pay or improved working and living conditions. When these miners came to South Africa it was natural that they would bring their political views with them. Many of them had come to South Africa because of the expectation of better pay, yet the conditions under which they worked were seldom better than the mines of Britain.

Similarly, miners and skilled artisans came from Australia and they brought with them a strong sense of unionism. It was a unionism described by some as syndicalism, with a

⁴³ J Krikler, *The Rand Revolt – The 1922 Insurrections and Racial Killing in South Africa*.

⁴⁴ E Rosenthal, *Gold! Gold! Gold! – The Johannesburg Gold Rush*, p. 344. See also C van Onselen, *New Babylon New Nineveh*, p. 6. Note there are many sources describing the origins of the white miners.

very strong bias to a political left that flexed its muscles on a number of occasions.⁴⁵ Although it was not called communism or Marxism it had many of the identifying principles of the two political ideologies. The initial rallying focal point for the British and Australian miners was the importation from 1904 by the Chamber of Mines of Chinese labour onto the gold mines in order to keep labour costs down. Use of Chinese labour was not universally supported by the mining houses or Randlords, although it was widely promoted by H Eckstein & Co, and the Albu brothers of General Mining.⁴⁶ The concept was strongly opposed by JB Robinson of Randfontein Estates Gold Mining Company.⁴⁷

In 1902 the white miners formed themselves into a mining union, the Transvaal Miners Association (TMA). This union had been vehemently opposed to the importation of Chinese labour as an alternative to African labour. Africans, after the Anglo-Boer War, were reluctant to return to the mining industry, primarily because wages had been set at a lower rate than they were before the war started and there were growing racial tensions between black and white miners. The fear amongst white miners was that they would ultimately be replaced by semi-skilled Chinese labour. Most active in this campaign were the Australians. When the Victoria goldfields in Australia had been opened, Chinese labour had ousted many Australian miners. The leader of the TMA was Tom Mathews, but it was those who were associated with him in various labour movements on the Witwatersrand that represented a radical group of strongly far left labour leaders, people such as JT Bain, WH Andrews and Archie Crawford of the Amalgamated Society of Engineers.⁴⁸

By the end of 1906, the post-war economic boom was collapsing. The days of white employment in mining and industrial sectors were coming under increasing economic pressure. By the early part of 1907 hundreds of white mine workers were unemployed and a bitter irony is that instead of standing together, the British and Australians held

⁴⁵ J Hyslop, *The Notorious Syndicalist*.

⁴⁶ JDF Jones, *Through Fortress and Rock – The Story of Gencor 1895-1995*, pp. 48-52.

⁴⁷ G Wheatcroft, *The Randlords – The Men who made South Africa*, p. 222.

⁴⁸ J Hyslop, *The Notorious Syndicalist*, pp. 159-163.

themselves aloof of the similarly unemployed Afrikaners, a policy that was to backfire within a few months.

Still determined to reduce costs, the mining houses allowed Chinese and African labourers to take more semi-skilled and skilled jobs and Botha's Transvaal Government, keen to see the mines in production, turned a blind eye to the opposition from the TMA. When the miners went on strike in 1907, the strike was quickly put down by the use of Imperial troops. The result was that Afrikaners moved into mining positions often replacing British and Australian miners. In the short term it gave the mines and the government what they wanted – gold production and revenue. As a long-term solution it was a disaster, because it brought nationalist Afrikaners into a close work environment with African labour, and with socialist British and Australian labour. The result was a three-way development of racialism in the mining industry.

The sources indicate that there were a number of small silver mines and prospects in operation during the period 1907-1914. However, there is no indication that the general labour unrest during this period extended to the silver mining operations. A possible reason for this is that many of the mines were operated by only a few European miners and so they had no real negotiating power with their respective owner managements. By May 1913 the mining houses were once again set on a course of union-busting activities. It began at the New Kleinfontein mine near Boksburg, when the manager insisted that five engineering workers had to extend their Saturday shift to match that of the miners and they refused. The Amalgamated Society of Engineers along with the TMA and JT Bain of the Transvaal Federation of Trade Unions held a meeting at which they urged strike action. This was the turning point for labour, because the leadership of the unions and the federation bodies had finally decided to show their true colours. The strike was about power or the development of syndicalist ideas - control of the means of production and distribution, which by extension, also means control of the state.⁴⁹

As was to be expected the mines refused to negotiate and the Chamber of Mines was certain that once again the Government would apply military force to put an end to the strike. The attitude of the mining bosses can be summed up by a quote from Lionel Phillips, Chief Executive of the Rand Mines group and successor of the H Eckstein group:

⁴⁹ J Hyslop, *The Notorious Syndicalist*.

“A general strike would of course be a serious matter from a dividend-paying standpoint. I do not think, however, that it could last very long and, if it does happen, we must make up our minds once and for all to break the unions here...”⁵⁰

By 2 July 1913 a quarter of the white miners – 5000 – were out on strike and by 4 July a call for a general strike was answered by 18 000 miners. With large numbers of men roaming the streets it was natural that rogue elements would take certain actions. When fighting broke out between Imperial troops and rioting strikers, 100 strikers and onlookers were killed. The government was eventually forced to negotiate and despite being humiliated, managed to settle the situation and the strike fell apart. In 1914 an attempt by the Syndicalist elements to repeat the General Strike was met by a well planned response by General Smuts, the deputy prime minister. He quickly deployed 10 000 troops to the Rand and mobilised a total military force of 70 000 troops who were put on alert countrywide. By declaring martial law he then ordered the arrest and the illegal deportation without any form of trial of nine union leaders.⁵¹ It would be interesting to know if such strike action would have continued beyond 1914 had the First World War not intervened or the deportation of the nine union leaders had not happened.

In 1919, potential trouble between white workers and the mining companies was once again developing. JC Smuts had become Prime Minister after the death of Louis Botha. Politically Smuts had been damaged by his handling of the 1914 strike. He also lost considerable Afrikaner support when a group of former commando leaders rose up in what became a failed rebellion against the Botha/Smuts government, because Botha had taken South Africa to war against Germany. The mining companies wanted assurances from Smuts that should industrial trouble occur then the Government and the army would once again intervene.⁵²

Proposed pay cuts to coal miners at Witbank led to a strike beginning on the 2 January 1922. Within ten days 24 000 Industrial Federation members were out on strike. By the end of January worker militancy was rising, especially among the nationalist Afrikaner

⁵⁰ C Saunders, (ed), *Reader's Digest Illustrated History of South Africa – The Real Story*, p. 304.

⁵¹ J Krikler, *The Rand Revolt – The 1922 Insurrections and Racial Killing in South Africa*, p. 38. See also J Hyslop, *The Notorious Syndicalist*, pp. 229-241.

⁵² J Krikler, *The Rand Revolt – The 1922 Insurrections and Racial Killing in South Africa*, pp. 45-49.

workers. It became clear that communist sympathisers were behind the movement to break the power of the mining companies. By February the strike persona had devolved from leadership through the South African Industrial Federation to a militant Afrikaner Action Committee. This committee ignored the demands of the communists that Africans should not be attacked or that mine officials should be left alone. By March the whole of the mining area of Johannesburg had been seized and the Afrikaner leaders were calling for the armed overthrow of the state – the Smuts Government. At this point Martial Law was declared and some 20 000 troops, backed by tanks, field guns and aeroplanes, became involved in a series of bloody and deadly skirmishes from Boksburg to the final battleground of Fordsburg. The cost in terms of lives was very high at 43 soldiers, 86 policemen, and 81 civilians, of whom 42 were bystanders and included a number of Africans killed by the strikers.⁵³

The attempt to overthrow the government had failed at a huge cost both in lives, the economy of the Witwatersrand and of the country. Did the 1922 strike have any impact on the silver mining industry? In 1922 there were only two operating silver mines – Transvaal Silver and Base Metals Ltd (TSBM) and the Pretoria Silver and Lead Co Ltd. Although the strike began in Witbank, it is logical that any mining activity between Witbank and Johannesburg would have been affected. No reports of violence were reported by either the TSBM or Pretoria mine companies. It appears that the white workers simply downed tools and walked off the properties between the 8 and 20 March 1922.⁵⁴ The result of the strike for the country was strong labour legislation in the form of the 1924 Industrial Conciliation Act.

Labour problems plagued all industrial countries in the early part of the twentieth century; it was symptomatic of the social and political changes of the time. The emergence of National Socialism and communism alongside capitalism was to become the catalyst that spawned many wars and disputes throughout the twentieth century; the First World War was the first major war. A war that was as much about state controls over other states as about social and political changes. The First World War was to see the ending of the use of the ‘Gold Standard’. Most countries that had been part of the

⁵³ T Cameron & SB Spies, *An Illustrated History of South Africa*, p. 246.

⁵⁴ ‘Transvaal Silvers Progress’, *The South African Mining and Engineering Journal*, (29 April 1922), p. 1167.

Gold Standard (backing their currency with gold at a set rate of exchange) before the First World War abandoned the Gold Standard at the outbreak of the War, because of a breakdown in international currency agreements.

After the war, Germany was the hardest hit economically. It was required to pay crippling war reparations to the Allied powers. This decimated Germany's gold reserves and its un-backed paper currency went into hyperinflation in 1922-24. Faced with economic, political and social collapse, Germany re-adopted the 'Silver Standard' and in June 1924 its reintroduction of the silver Mark led to an increase in the international demand and price of silver, which peaked in the years 1924-25.⁵⁵ Ironically, the increase in the price of silver helped the German mining industry to recover, especially its silver-rich lead mines, but unfortunately the price rise was too late for the Argent mines, which by 1925 were once again closing down, due both to the economics of the local mining industry and to the primary fact that the development of the deposit at Argent was failing to disclose any further economically recoverable areas of ore. This will be discussed further in chapter 4.

The prices of silver and lead from the earliest possible date available, that being 1882, were plotted using the records of H Eckstein & Co. In developing the values for the two metals from 1882 to 1999, several problems were encountered. Although a table of the average values of silver in US \$/ounce was found, and has been used,⁵⁶ a similar source for lead has not been found. In South Africa, the Chamber of Mines was unable to help with historical values and the Johannesburg Stock Exchange does not track metal prices. The London Metal Exchange does not keep historical data as far back as the early part of the nineteenth century, let alone the 1890s. A United States Geological Survey site was found and used, as it gave the annual price of lead per ton in dollars per metric ton from 1900 to 1999.⁵⁷ Despite attempts to find the price of lead per ton from 1882 to

⁵⁵ Silver prices and historical averages – 1792 to 2009 at http://www.goldmastersusa.com/historical_precious_metals_prices.asp (accessed on 03-09-2011).

⁵⁶ *Ibid.*

⁵⁷ US Geological Survey – Historical statistics for mineral and material commodities in the United States at <http://www.minerals.usgs.gov/2005/140/lead.pdf> (accessed on 03-09-2011).

1900 no such sites were found. The only source for such values was found in the H Eckstein & Co Archives in the Barlow Rand Archives, Johannesburg.⁵⁸

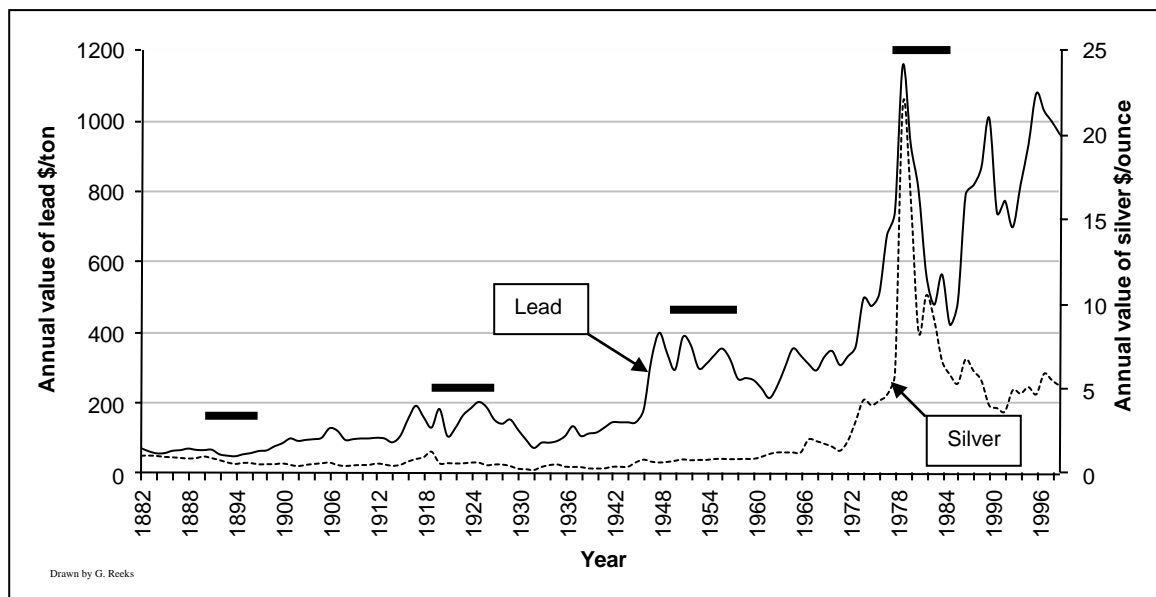
The table that was found in the records of H Eckstein & Co gave details of the value of soft lead (without silver content). The values are tabled from 1882 to 1901 and reflect the highest and lowest values for the metal in pounds sterling. It is not clear if the values are for a short ton (2000 lbs) or standard ton (2200 lbs) and it was decided to use the values for a standard ton. It was necessary to convert the sterling values to dollar values using the currency conversion rates of the 1890s. An historical currency conversion site was found and used to convert all of the sterling values of the Eckstein document to US dollars.⁵⁹ The values used in the graph reflect the mean values for each year from 1882 to 1899, converted from the sterling prices to a dollar value.

When the dollar values for lead for the years 1900 and 1901 were compared with the data from the US Geological Survey site, there is a value variance of about \$17 between the two sources. It may be that the Eckstein figures are based on short tons; however, that would only account for a variance of 10% and not the 17% variance. It was decided to utilize the figures given in the two tables and plot them on the same graph to show the variations of value of the two metals over the one hundred and twenty year period. Also indicated on the graph and of particular importance are the periods that the mines of the dissertation were in production. The result is that the variance is hardly noticeable as there were no large price fluctuations of lead between 1882 and 1900. It was decided to ignore the variance between the two sources as it is the trend that is more important to graph.

As only one group of mines – the mines at Argent - were developed and operated in the 1890s, the 1920s and the 1950s and had a return of interest from the mining company in the 1970s, it was decided to plot the periods of such activity to ascertain if there were any possible economic trends for the timing of the periods of interest. The graph below shows four horizontal black bars above the two graph lines and these indicate the most active periods of mining and prospecting activity in the greater Pretoria region.

⁵⁸ Archives of H Eckstein & Co Ltd. Volume HE 5 Appendix 27.

⁵⁹ Dollar – Pound exchange rates from 1791 at <http://www.measuringworth.com/exchangepond> (accessed on 09-08-2011).



Graph 1. Prices of lead and silver and periods of major South African silver mining activity (black bars) in the greater Pretoria region 1882 – 1999.

The graph for silver demonstrates - less significantly - the reasons to start mining a metal than the graph for lead does. It must be remembered that even in current mining operations, where silver is recovered as a metal, it is as a by-product. South Africa currently produces about 172 tons of silver per annum as a by-product of gold and platinum mining including a smaller production from lead and zinc mining.⁶⁰ Interestingly this value is approximately double the total production of the Pretoria silver mines during the period of the dissertation. In the 1880s and 1920s the major metal being mined was lead or copper, but it was lead and copper significantly rich in silver per ton of ore recovered and so it is correct to call the operations silver mining.

The first bar in the graph shows that in the period 1889–1897 the mine at Argent (Transvaal Silver Mines Ltd) was opened and developed as the price of lead and silver was in decline. In fact the serious decline in prices was around 1892. By 1894 both metals had reached a low point in value and, coupled with the political problems of the Jameson Raid of 1895-6, the mine had little chance of economic survival. The world production of silver in 1911 had reached 6 407 tons, but by 1917 this had declined to 4 734 tons, at this point the graph shows a rise in the price of both metals.⁶¹

⁶⁰ MGC, Wilson & CR, Anhaeusser, *The Mineral Resources of South Africa*, pp. 7-10. The amount as in 1998.

⁶¹ 'Transvaal Silver successful flotation', *The SA Mining and Engineering Journal*, (20 December 1919), p. 321.

After the end of the First World War in 1918 General Mining Corporation made a decision to reopen the old Transvaal Silver Mines Ltd mine, re-naming it the Transvaal Silver & Base Metals mine. The graph shows that the price of lead and silver had increased significantly and although there was a dip in the price of lead and silver in 1921, lead recovered and held its price until 1931. From 1931 lead declined back to its pre-1916 price and did not recover until the late 1930s, when the threat of the Second World War and the resultant re-arming led to a greater demand for lead.

In late 1946 lead prices began a climb that would see new average levels reach around \$330 per ton for a ten-year period. It was during this period that a Gold Fields - General Mining - Anglo American consortium re-prospected the Argent mines area and reopened and mined some of the old mines including the 1920s Transvaal Silver & Base Metals mine and the Brakfontein mine under a company named the Argent Lead and Zinc Co Ltd.

By 1957 lead prices again fell and the mines that the Gold Fields consortium had reopened and were mining, were closed, and effectively mothballed. In the early 1970s rising prices of both lead and silver led to reviews of their mine holdings by the consortium. Ironically, just when it looked as if there was a possibility of reopening some of the operations, the price of both lead and silver fell as dramatically as it had risen. The geological reports were not encouraging for the finding of further large, economic deposits in the Argent area and the consortium was effectively abandoned.

It is notable that the graph on page 22 reflects that silver did not regain its 1918-19 value until around 1960. Even at the current value of silver it would be uneconomic to mine it unless it was a by-product of other valuable metals such as gold, platinum or copper. Why then is there this apparent romance about mining silver, why do we talk about 'silver mines' when in reality they are copper or lead mines? The answer probably lies in our historical attitudes towards precious metals such as gold and silver. They were perceived as metals of significance in historical times and this - almost aura of them - has continued up to present times. Certainly, in the late Victorian period, gold and silver held such power for investors that often defied common sense. Silver had been debased as a currency by most of the economic powers of the time, the Sherman Act in the USA gave it a brief respite, but the repeal of the Act in 1893 was the end for

silver as a currency in America. Its lure and demand lay in jewellery and silverware. Today one of the greatest demands for silver lies in the micro-electronics industry, where it is used in the manufacture of printed circuits.

Table 2. Estimation of the amount of lead, silver & associated base metals recovered from the 25 silver mines of the greater Pretoria region.

| mine/farm | period of production | ore produced (tons) | lead (tons) | silver (kg) | copper (tons) | zinc or antimony (tons) | gold (kg) | sources |
|---------------------------|----------------------|---------------------|-------------|-------------|---------------|-------------------------|-----------|---------|
| Albert Silver | 1892 - 1893 | 20 000 | | 2 280 | 2 000 | | | 1 |
| Victoria Regina Silver | | ? | | | | | | |
| Silver Hill Mining | | | | | | | | |
| Welverdiend | | | | | | | | |
| Uitkomst Dev. Syndicate | | | | | | | | |
| Dwarsvlei Syndicate | | | | | | | | |
| Rhenosterspruit Mine | | | | | | | | |
| Nevada Silver & Smelting | | | | | | | | |
| Broederstroom Lead | 1907 - 08 | 14 | 9.8 | | | | | 2 |
| Roodekrans Mine | 1906 - 07 | 75.5 | 45.5 | 85 | | | | 2 |
| Silver Hill on Doornranje | 1967 | ? | | | | | | |
| Leeuwenkloof Mine | 1907 - 25 | 1 272 | 924 | 77 | | | | 2 |
| Boschkop Silver Mine | | ? | | | | | | |
| White Swan Argentiferous | 1890s | ? | | | | | | |
| Spitzkop Mine | 1924 - 1928 | 48 | 38 | ? | | | | 2 |
| Witpoortje Syndicate | | | | | | | | |
| Willows Silver Mine | 1889 - 1891 | 12 367 | | 18 946 | 482 | 245 | | App 3 |
| Willows Extension Synd. | | | | | | | | |
| Mundt Silver Mining | | | | | | | | |
| Edendale Lead Mine | 1890 - 1938 | 6 333 | 4 762 | 1 127 | | 105 | | App 3 |
| Argent Mines (see note) | 1889 - 1956 | [272 000] | 24 967 | 72 429 | 254 | 3081 | 20 | App 3 |
| Varsfontein Silver Synd | | | | | | | | |
| Totals | | 292 110 tons | 30 747 tons | 92 664 kg | 736 tons | 3 186 tons 248 tons | 20kg | |

Notes: The collective title of Argent Mines includes the Transvaal or Argent main mine (Dwarsfontein), Brakfontein mine, Boschpoort mine and Pretoria mine (Dwarsfontein). At various stages they were mined as one company and so the results are often combined in the sources. For a breakdown of tonnages produced at various stages see Appendix 3 (App 3). The tonnage of ore mined at Argent is based on the total tonnage of lead produced at an average of 64% lead/ton. It is intended merely as a general guide and it must be stated no such consolidated amount appears in any of the known sources. Where no entries are given, then the production data for the mine has not been found and so it is not known if any production of ore took place. Where productive output was known to have taken place, but no figures have been found in any of the sources, a question mark is inserted. In the column 'mine/farm' only the farm name or a shortened form of the mine name has been used due to space constraints. Note 'Synd' is an abbreviation for Syndicate.

Sources indicated in the table:

1. LJ Robb, et al. *'The Albert Silver Mine Revisited: Towards a Model for Polymetallic Mineralisation in granites of the Bushveld Complex, South Africa.'* p.1.
2. Council for Geoscience, Pretoria, PH Allport, 'Lead Production of the Union of South Africa', Report no. 1940-0070, 1940, p. 10.
3. Appendix 3 (appears at the back of the dissertation).

This chapter has explored the various political and economic events that impacted both the individual silver mines and the silver mining industry of the greater Pretoria region. The economic collapse of industry, per se, in Johannesburg in the early 1890s not only created havoc in the gold mining industry, but also affected the silver mining industry of greater Pretoria. It was not the events themselves, but the timing of a number of interrelated local and international events that created the havoc and economic damage.

The rise and collapse of the international silver market from the 1860s ultimately led to the crisis in 1893, when the USA repealed the Sherman Purchase Act creating a free-fall in the international price of silver. The impact on local silver mines was the closure of most of the smaller mines and prospects. Table 1 shows the closure date for many of the mines as '1892'. The mines that were producing good quantities of silver - such as the Albert, Willows and Argent mines and which form the main part of the text in the next three chapters - were also affected by the falling price of silver. However, it will be shown that other factors, such as bad management decisions coupled with local political events, would ultimately be the final blow to the operation of the richer mines in the 1890s. Having said this, however, it will be shown that the major political event - the Jameson Raid - was not the sole cause of the closure of the Argent mines. It was not the Jameson Raid that created such a state of flux in the industries of Johannesburg and Pretoria; it was the collateral damage of the arrest of the Reform Committee members, most of whom were the captains of various industries and companies, many of whom were directly involved with silver mines.

The Preface raised two questions - who developed silver mining in the region and what role did the Randlords play in the development of the silver mining industry? It has been shown that during 1890s the principle investors in silver mining were the Randlords. They had both the capital and the driving force required to float new ventures. Many of the people involved at shareholder and director level were either other Randlords or those whose economic status did not equal that of the Randlords. Throughout the following chapters many of these men will be drawn into the text.

H Eckstein & Co became a dominant force in the control and operation of various industrial operations in the 1890s and through to the early twentieth century. They controlled some of the richest gold mines and two of the richest silver mines - Willows

and Argent. They grew economically and politically and because of loans to the Kruger government on two major projects they were able, subsequently, to effect decisions on the taxation of the silver mining industry as well as influence the government to reverse decisions such as the opening of the silver mines as ‘public diggings’.

From 1907 there was a significant growth in white miner trade unionism. Because of the growth of this unionism and the political affiliations behind it, the Witwatersrand was to experience revolution and death on the mines from 1907 to 1922. The background to this growth was discussed in order to place the walk-out of miners from two of the silver mines in 1922 in context.

An analysis of the price of silver and lead (lead being one of the sources of silver in South Africa) from 1882 to 1999 shows how the major political and economic events influenced the price of the two metals. The graph shows the relationship between active mining periods and the rise in the price of the two metals. The active mining periods were clearly affected by the rise or peaks in the international value of the two metals and the dissertation continues with this theme to explain the development and impact on the seven mines which are discussed.

In developing the history of silver mining in the greater Pretoria region from 1885 to 1999, many documents dealing with the production results or values of the metals in the ores have been utilised to attempt a review of the total production of silver and associated copper, lead and other base metals. In other words how significant was the industry? The few documents that were in the public domain mentioned figures of 1.5 million ounces (42 535 kg) of silver but this was thought to be incorrect or at best only part of the total production. Research of the silver mines of the greater Pretoria region has revealed that none of the sources have consolidated the production figures, especially for silver. This includes various reports by the Council of Geoscience and its predecessor the Geological Survey of South Africa. The partial exception was PH Allport’s report in 1940, but this report was primarily designed to look at lead production in the Union of South Africa from 1903 to 1938 and so did not capture the

data for other deposits in this dissertation containing copper and silver or any of the deposits mined before 1900.⁶²

Table 2 on page 24 is believed to be the first consolidated table of the production outputs from the silver mines of the greater Pretoria region. It shows the mines, coupled with known and estimated outputs of the various metals associated with silver. Reference should also be made to Appendix 3, where actual and potential outputs are produced for the Edendale, Willows and the Argent mines, the results of which are reflected in Table 2. It was evident that the highest yielding mines were the Albert, Willows, Edendale and the four 'Argent mines'. It is therefore these mines on which the history of silver mining in the greater Pretoria region has been written in this dissertation. In the next chapter, the history of the silver mines begins with studies of the Albert, Willows and Edendale mines.

⁶² Council for Geoscience, Pretoria, PH Allport, 'Lead Production of the Union of South Africa', Report no. 1940-0070

Chapter 2

MIXED FORTUNES: THE ALBERT, WILLOWS AND EDENDALE MINES

As so many mines and prospects were discovered during the research phase of the dissertation, listing them all would look like a catalogue of mining operations. As stated in the closing paragraph of chapter 1, only the history of the seven major producers of silver will be discussed. The silver ore of the deposits of the greater Pretoria region were either argentiferous copper or argentiferous lead. The Albert and Willows mines were dominantly argentiferous copper, and the Edendale and ‘Argent mines’ were argentiferous lead deposits. The seven mines were linked in the 1890s by virtue of the period of operation, directorial or shareholder ownership or investment interest and the desire by those who controlled them to expand their entrepreneurial activities.

In the Preface it is shown how and why the Randlords became the dominant owners, directors and share-holders in the silver mining industry of the 1890s ZAR and why they became involved in the mining of silver. In chapter 1 it is discussed how the development and periods of operation of the silver mining industry in South Africa was directly impacted by both local and international political and economic events. All of the silver mines in the greater Pretoria region ceased to operate by the mid-1890s due to a variety of reasons, dominant of which was the rise and collapse of the international silver market. The one exception was the Edendale mine which appears to have continued operating up to the beginning of the Anglo-Boer War in 1899, most probably because of the high lead content of the ore and the rising price of the metal – which is illustrated in Graph 1. The mines in this and the following chapters are important in the political and economic machinations of the 1890s and in the case of the ‘Argent mines’, also in the 1920s and 1950s period.

It is not the intention in this dissertation to describe the operation of the individual mines. How a mine operated and produced a finished product varied from mine to mine and is outside the scope of this dissertation. However, in order to understand the developmental history of the individual mines, the details of shafts, levels and processing plants are brought into the text. This is done in order to illustrate the successful and declining periods and how in periods of economic growth the mines

would develop areas of rich ore. It will also be shown how all of the mines made similar mistakes of developing without sufficient capital, which compounded the problems of the beneficiation of their ores. The Willows and 'Argent mines' were the only two to install smelting plants in the 1890s, yet in both cases the smelting operations were ultimately failures. The relevant sections of chapters 2 and 3 will illustrate that the smelting managers at both mines made fundamental mistakes in the design of the furnaces and their subsequent operation. Only in the 1920s can the smelting of lead at Argent to produce lead bullion be considered a success. In the 1890s, after the failures of smelting operations, both mines returned to the original methods of crushing, concentrating and shipping the concentrates as their finished product. The management of the Albert mine did have plans to install a smelting plant, but the plan was never implemented, possibly due to cash flow problems and the difficulties of transporting coke to the mine. The success of a mine is not measured by how big it is or how long it lasted in operation, but by how much finished product it profitably produced. The success of the Willows mine was defined by the simple fact that in its six years of life it produced 19 tons of silver, at a profit, and was the largest producer in the 1890s period of South African history. Hence, the criteria for deciding on which mines to focus on, was how much silver they produced. On this basis, this chapter will deal with the individual, and where possible integrated, histories of the Albert, Willows and Edendale mines. As the mines began their lives in different years, an attempt has been made to reconstruct the histories of the mines in as integrated a manner as is possible, but on occasions the dates are not strictly chronological.

An area to the northeast of Pretoria was originally prospected by Alois Hugo Nellmapius and probably other prospectors. It is not known what he was searching for, but in the 1880s the primary search of the majority of prospectors would have been for gold. To find a deposit of metal ores meant a potential financial return for the prospector, or a group, who formed either a syndicate or company to mine the deposit. In 1885 Nellmapius found a deposit of argentiferous copper on the farm Roodepoortje. The farm originally belonged to Christiaan Joubert, who in 1892 became the Minister of Mines in the Government of the ZAR. Nellmapius subsequently purchased the farm in order to exploit the minerals.¹ Nellmapius was to become famous for his involvement in

¹ 'The Albert Silver Mines', *The South African Mining Journal*, Vol. 1, (13 August 1892), p. 809. This report gives the greatest details on the mine of any source.

the Hatherly distillery at Eerste Fabrieke situated east of Pretoria (near present day Mamelodi) and ultimately he became a close friend of President Kruger.

During the prospecting in the late 1880s–1890s ‘rush’ to find the rich deposits of ore, dozens of deposits of argentiferous-copper or argentiferous-lead ores were discovered on many of the farms in the greater Pretoria region. Most of the options and prospects never developed into significant mines. Revival periods in the 1920s and 1950s were often driven by the bigger mining companies with better prospecting tools, but they still failed to reveal any new significant deposits. Only two deposits of importance - Edendale which is fully dealt with in this chapter and the ‘Argent mines’ - fall into these periods, as well as the 1890s period. After Nellmapius discovered the argentiferous copper deposit in 1885, there is a gap of a year before the records show that a company - the Albert (Silver) Mine Ltd (hereafter Albert mine) - was formed and listed on the Johannesburg Stock Exchange. Helga Kaye, in her biography on Nellmapius, states that he named the mine after his son Albert. Although it has not been possible to confirm this, it does seem a reasonable assumption. It is known that he named his Pretoria house after Albert and later he was to name his farm, which eventually became a suburb south of Pretoria, after his daughter Irene.²

Although it appears that the Albert mine was formed as a company in 1886, it was only in 1889 that Nellmapius became a director.³ The investment in the Albert mine created an expectation of more deposits in the greater Pretoria region and led to the region becoming the target of many prospectors in a search for similar silver deposits. In 1888 and 1889 further discoveries of silver bearing ore were made on adjoining farms.⁴ The Albert mine was operated from 1886 to 1892. The ore of this mine was essentially argentiferous-copper mixed with metallic sulphides of zinc, lead, uranium, antimony and arsenic. It was this mixture that was to make the ores of the Albert mine very difficult to separate and

² H Kaye, *The Tycoon and the President – The Life and Times of Alois Hugo Nellmapius 1847–1893*, p. 70.

³ CS Goldman, *The Financial, Statistical and General History of the Gold and other Companies of Witwatersrand, South Africa*, p. 214.

⁴ The research revealed that two other mining companies were formed in the late 1880s to mine options on the adjoining farms to the Albert mine. They were the Victoria Regina Silver & Copper Mining Company and the Silverhill Silver Mining and Developing Syndicate, Note that these two mines are not discussed in detail in the text. The main sources for the information were *The Standard and Diggers’ News*. As no records of production for the mines could be found they are not discussed in detail.

probably led to its ultimate closure. These metallurgical difficulties, apart from being mentioned, are beyond the scope of this dissertation.

It has not been possible to establish the exact date when the Albert mine company was floated; however it must have been during 1886.⁵ The prospectus for the Victoria Regina Silver & Copper Mining Co Ltd, dated July 1887, mentions the floating of the Albert mine some 12 months before.⁶ The original directors of the Albert (Silver) Mine Ltd were Isaac Lewis, Samuel (Sammy) Marks, F Clench, Lewis P Ford, Carl Jeppe, TW Beckett and JP Hoffmann.⁷ Lewis and Marks had both been involved with diamond mining in Kimberley and gold mining in Barberton. They were to become very well known Randlord industrialists, with interests and concessions from Kruger. The most famous were the alcohol concession and factory at Eerste Fabrieke and various coal mine concessions near the Vaal River. Ford and Jeppe were partners in a legal practice in Johannesburg and were to become land developers, giving their names to two of Johannesburg's suburbs - Fordsburg and Jeppestown. TW Beckett was one of Pretoria's most important general traders and became Chairman of the ZAR National Bank - discussed in chapter 1. F Clench was to be involved with the first Chamber of Mines. No biographical details have emerged on Hoffman.⁸

The richness of the deposit that became the Albert mine is demonstrated by the extract in the book *The Goldfields Revisited*, by Edward Mathers. Writing about a visit to the laboratory of Mr Dawson at the Government Assay Office of the ZAR in 1887 he states "...one huge block from the Albert Mine, I was assured, gave a test at the rate of 58% copper and 500 ounces of silver to the ton."⁹ To put these figures in perspective many

⁵ No records were found in the Registrar of Companies files.

⁶ Prospectus of the Victoria Regina Silver & Copper Mining Company', Archive Guide no A743, File GC 10, Archive of Historical Documents, William Cullen Library, University of the Witwatersrand, Johannesburg. It is clear from this source that other deposits in the area, though not part of the Albert Silver mine, were just as rich. This source also gives details of how JB Taylor – a future Randlord - was involved with the Victoria Regina mine several years before he became a partner in H Eckstein & Co.

⁷ CS Goldman, *The Financial, Statistical and General History of the Gold and other Companies of Witwatersrand, South Africa*, p. 214.

⁸ Where possible, more detailed biographical notes have been created from sources, see Appendix 2.

⁹ EP Mathers, *Golden South Africa, or, The Gold Fields Revisited being Further Glimpses of the Gold Fields of South Africa*. (Durban: Davis & Sons, 1887) This book was reprinted by The State library, Pretoria in 1970 as reprint number 53.

modern copper mining operations around the world are mining ore at a few percent copper per ton and a value of 500 ounces of silver per ton of ore is unheard of now. At best in most modern silver mines it may be a few ounces per ton. On the strength of the high assays of the deposit, in January 1888, an advertisement in the *Transvaal Advertiser* stated: “Wanted: A First class Foreman. Must have had experience of sinking shafts, levels, only practical miners of intelligence need apply, also a good blacksmith.”¹⁰ Clearly, the management of the Albert mine wished to develop the mine via shafts and levels. It probably indicates that they were planning on creating ‘stopes’ or mining areas between levels in order to mine the ore which occurred in a near vertical fissure vein.



Fig. 1 Alois Hugo Nellmapius circa 1889.

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Nellmapius corresponded with the partners of H Eckstein & Co for three years trying to interest the Eckstein Company to invest in the Albert mine. In November 1889 Eckstein wrote to Nellmapius:

...I note you have a very high opinion [of the prospects]...I made enquiries about the lode and find that with the exception of a few rich stringers, shaft one is practically barren...Look how often the Alberts have reported wonderful discoveries and how they proved bogus on examination.¹²

¹⁰ ‘Albert mine looking for a foreman’ *Transvaal Advertiser* 10 January 1888.

¹¹ H Kaye, *The Tycoon & The President – The Life and Times of Alois Hugo Nellmapius 1847-1893*, Frontispiece.

¹² Archives of H Eckstein & Co Ltd. Volume HE 22, Letter book of H Eckstein to Nellmapius, 18 April 1890, pp. 8-10.

Eckstein was also raising serious concerns about the ineptitude of the mine's management with Nellmapius, by stating: "To pay a quarter of a million pounds sterling for what has been done in one shaft is over-capitalising it."¹³

Early in 1890 Lionel Phillips, one of the partners of H Eckstein & Co, reported to Alfred Beit that there were problems with the Albert mine deposit. Eckstein's consulting engineer, Hennen Jennings, on visiting the Albert mine was clearly worried about the complex mineralogy, because he had stated that although "...the lode was impressive, he had never seen such a complicated lode, a great variety of metals apparently being locked in the same vein..."¹⁴ One week later, in another letter to Beit, Phillips appears to declare that H Eckstein & Co should be wary of getting involved with the Albert mine:

Albert Silver - Mr Jennings took average samples from all parts of the mine and the assays return is only about 4 to 5 ozs of silver. The rock is extremely hard and expensive to mine and Mr Jennings' brother thought that in such a mine at least an average of 35 ozs would be required to return good dividends. There appears to be rich streaks in the vein which contains up to 200-300 ozs of silver per ton, it is impossible to estimate whether any portion of the lode can be worked by itself and made to pay.¹⁵

A year later, the partners were still talking about the bad planning or management at the Albert mine when JB Taylor - partner with Eckstein, but based in Pretoria - wrote to Eckstein that it appeared that the main shaft had been badly placed in relation to the ore body and that after consultation with engineers it had been decided by the Board of the mine to sink the shaft to 100 m without carrying out further development.¹⁶ From the sources it has been determined that a mine consulting engineer, M Eissler, was appointed in the latter half of 1891.¹⁷ The mine manager in 1892 was HB Bunkell, who

¹³ Archives of H Eckstein & Co Ltd. Volume HE 149, Letter book of L Phillips, 29 November 1889, p. 17.

¹⁴ *Ibid.*, 18 April 1890, p. 190.

¹⁵ *Ibid.*, 25 April 1890, p. 192.

¹⁶ Archives of H Eckstein & Co Ltd. Volume HE 189, Letter book of JB Taylor to Johannesburg office, 31 January 1891, p. 76.

¹⁷ 'Albert Silver Mine', *The South African Mining Journal*, Vol. 1, (14 November 1891), p. 113.

had been manager at the Oriental Gold Mining Co in Barberton.¹⁸ It has not been clarified if he replaced anyone or if he was the first manager.

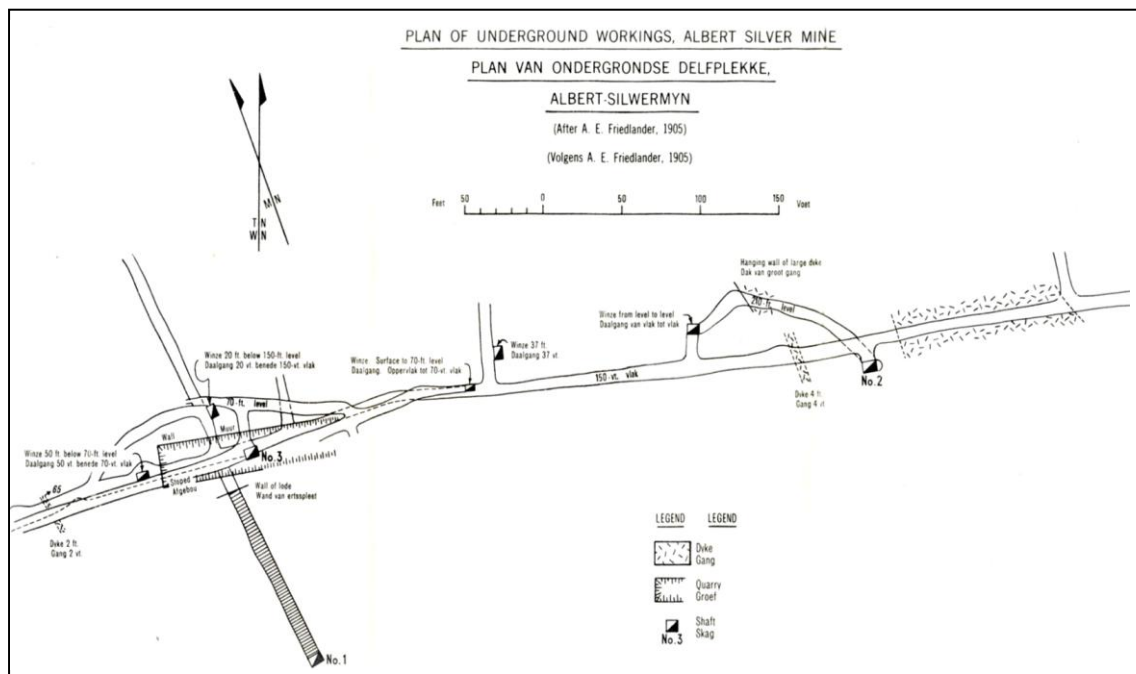


Fig. 2 Plan of the underground workings of the Albert Silver mine dated 1905.¹⁹

Finance was a major concern during the life of the Albert mine and the sources continually refer to the need for fresh working capital. The original capital of £9 600, raised through the sale of shares, was far too small for the venture and the management had to raise additional capital of £50 000 in 1888, both for operation of the mine and in part to repay loans.²⁰ Two years later a further issue of 50 000 shares increased the capital from £50 000 to £100 000,²¹ and by 1893 a notice in *The Transvaal Mining Argus* states that the shareholders at a special general meeting were to consider raising the capital of the company to £200 000.²² In November 1890, Eckstein wrote to Nellmapius: “The company never seems to get any further than shaft-sinking - surely,

¹⁸ ‘The Albert Silver Mines’, *The South African Mining Journal*, Vol. 1, (13 August 1892), p. 810.

¹⁹ JSV van Zijl, A Geological-Geophysical Investigation of the Albert Silver Mine North of Bronkhorstspuit, Transvaal, Bulletin 43.

²⁰ CS Goldman, *The Financial, Statistical and General History of the Gold and other Companies of Witwatersrand, South Africa*, p. 214.

²¹ *Ibid.*

²² ‘The Albert’, *The Transvaal Mining Argus*, 14 September 1893.

with the money in hand, some effort at production might have been made during the last four years.”²³

A report on the Albert mine appeared in *The Transvaal Mining Argus* in May 1892 and describes the discovery of a rich lode of ore “...carrying pure native copper...”, and that the stamp battery was due to arrive shortly for the crushing of the argentiferous rock.²⁴ By November the same paper was stating that the erection of a 10-stamp battery was nearing completion.²⁵ However, another source states that a 20 head Sandycroft battery was erected and an ore dressing plant included Scoular tables, Frue vanners, continuous bed jig and hydraulic separators.²⁶ This machinery definitely falls into the category of concentrating equipment. No details have been found in the sources describing the treatment plant, so it is impossible to know what metallurgical processes they used or planned to use to separate the minerals in the complex ore body. The ore dressing equipment was only brought into service towards the end of 1892, some five years after the mine was opened.²⁷ Why such equipment was ordered and installed so late in the life of the mine is not known. It is known that they had a stamp mill - to crush the ore - although the sources differ as to whether it was a 10 or 20 head battery, but that appears to be only from 1892. The sources do not clarify how they were treating the ore before 1892 – did they have a smaller stamp battery or were they high grading the ore by hand and shipping it as bagged ore? The latter is the more probable scenario. The concentration idea came very late and the falling price of the silver market in 1892 was a financial blow that crippled development ideas both underground and on surface. Even at the time of the concentrating plant being commissioned the management of the mine were only planning on treating 50 tons of ore per day, a very low amount even by the standards of the 1890s.²⁸

²³ H Kaye, *The Tycoon and the President, the Life and Times of Alois Hugo Nellmapius 1847–1893*, p. 71.

²⁴ ‘Albert Silver’, *The Transvaal Mining Argus*, 27 May 1892.

²⁵ ‘Albert Silver’, *The Transvaal Mining Argus*, 4 November 1892.

²⁶ ‘The Albert Silver Mines’, *The South African Mining Journal*, Vol. 1, (13 August 1892), p. 810. [For an understanding of these terms see Appendix 1].

²⁷ *Ibid.*

²⁸ ‘Albert Mine’, *The South African Mining Journal*, Vol. 2, (2 October 1892), p. 56.

By October 1892 the share value of the company had dropped, yet in December the concentration plant was commissioned²⁹ and later in the month the syndicate was talking of erecting a smelting plant, rather than shipping the concentrates to Europe for smelting.³⁰ Clearly the management had no concept of the metallurgical difficulties that the complex ore body would present and it was compounded by an apparent ignorance of the falling price trends in the international silver market. It seems that disastrous management and bad planning in underground development in the life of the mine led to its demise in 1893. The deposit was proven by three shafts - the deepest reaching a depth of 122 m and drives over a distance of 416 m. The development appears to have occurred from 1886 to 1891. As the mine plan does not indicate stopes or mined out areas, it is likely that the majority of the recovered ore came from the development of the drives, rather than any stopes. The mine plan does show a greater amount of drive and winze development around the number 3 shaft and so it is possible that this area may also have been developed with mining stopes. The actual amount of ore recovered compared to development of shafts and drives probably became a serious financial problem for the mine in that the capital reserves were not being replenished by sufficient product sales. This may have prompted the comment by Alfred Beit - the London based senior partner of H Eckstein & Co - in a weekly letter to Eckstein in 1893: “Albert we must keep out of this – we have just seen Eissler [consulting engineer at the mine] and he does not have a high opinion.”³¹

A report appeared in *The South African Mining Journal* in January 1893 that a bar of silver had been brought to Johannesburg from the Albert mine. It was purported to be the first ever produced on the African continent. The bar measured 25 cm long, 12.5 cm wide and 2.5 cm thick. The ZAR mint had certified it as weighing 8.45 kg with a purity of 0.944. Eissler stated that they had 100 tons of concentrates on surface which assayed at 2.26 to 3.68 kg per ton silver.³² There are no records of the Albert mine ever having smelted ore or concentrates and there is no evidence of smelting at the mine as no slag was found in the area during a surface survey conducted ten years ago. Even if they had

²⁹ ‘Albert Silver Mine’, *The Standard and Diggers’ News*, 17 December 1892.

³⁰ ‘Financial and General Notes’, *The South African Mining Journal*, Vol. 2, (10 December 1892), p. 182.

³¹ Archives of H Eckstein & Co Ltd. Vol. HE 59, Letter book of Werner, Beit and Co to H Eckstein & Co, 22 April 1893, p. 5.

³² ‘Financial and General Notes’, *The South African Mining Journal*, Vol. 2, (21 January 1893), p. 259.

smelted the ore, they would not have had the technology or equipment to refine the bullion to the high level of purity given in the report. This event seems more likely a case of re-melting a bar of pure silver from another source and forming it into a rough bar and using it to raise speculative capital. Another inconsistency in the report is the statement that the first bar of silver was sent to Johannesburg and not to the Government in Pretoria. Surely if the management of the mine wanted to advertise the ‘success’ of the mine, they would show it to Kruger and his government first.

The same journal in March 1893 was stating that “...the concentration process seemed to be a success, and specimens of smelted ore had recently been given to the State President.”³³ Once again the statement does not make sense. In December the concentration plant was commissioned and within one month of that event, the management is talking of installing a smelting plant and by March they appear to be smelting. No reports of such a smelting plant having been ordered, installed or commissioned appear in the sources. In order to create the impression that the Albert mine was sound and a good investment, one ploy may have been to smelt some of the concentrates in a small furnace to form a crude lump of metallic compounds and call it smelted silver ore. Barely two months after Kruger is presented with ‘smelted silver,’ the management of the Albert mine announced that it was closing the mine.³⁴

The apparent scam of producing a bar of silver did not convince investors to risk their money. The lack of ore on the surface ready for treatment, coupled with the dramatic drop in the price of silver in the early to mid 1890s, may also have been significant factors in the closure. The operation closed as a working mine in May 1893³⁵ and at the time of closure, the company had an overdraft of £21 000 - underwritten by the directors.³⁶ The Editor of *The South African Mining Journal* published a scathing attack on the Albert mine management in the May issue of the journal:

...At few properties have such large amounts of working capital been so recklessly squandered, and at few, have the evil effects of incompetent

³³ ‘Financial and General Notes’, *The South African Mining Journal*, Vol. 2, (11 March 1893), p. 372.

³⁴ *Ibid.*, (27 May 1893), p. 545.

³⁵ ‘Albert Silvers’, *Standard and Diggers’ News*, 25 May 1893.

³⁶ ‘Albert mine’, *Standard and Diggers’ News*, 16 September 1893.

management been so convincingly exhibited. No excuse can be made for the directors, they were given a free hand by shareholders and, instead of proving the mine they have only succeeded in demonstrating their own incompetence.³⁷

It seems that management forgot the one basic rule of mining: remove ore at the same time as you develop, to make the venture pay.

There are several sources in the literature which state that the mine "...was discovered in 1885 and continued working intermittently until 1905" or "...continued working intermittently over a period of 14 years until 1905".³⁸ It has not been possible to establish the original source of these dates, but they may have been from the circa 1905 geological reports. Many of the incorrect dates in the modern reference works on South African mineralogy and mining have their origins in such reports. In 1905 the mine was surveyed and a plan drawn for the first time (Fig. 2). It is also possible that the date of this plan contributes to the erroneous dates for operation of 'to 1905'.³⁹

After the Anglo-Boer War the Albert mine may have been re-worked by a small group of prospectors until 1910, although no records of production were found.⁴⁰ In 1952, and again from 1967 – 1969 Anglo American Corporation conducted an extensive drilling program on the deposit to ascertain the viability of re-opening the mine. The Geological Survey of South Africa (now Council of Geoscience) conducted a geophysical and geochemical survey in 1970 and in 1994 the deposit became the subject of further mineralogical studies in the interests of providing a full mineralogical report on the deposit.⁴¹ None of these surveys were to result in the mine re-opening. It is known that the deposit is rich in silver and other metals with an estimated deposit of 70-100 000 tons of ore. For this relatively small ore-body, the cost of modern beneficiation of such complex ores would probably not be recovered by the sales of the metal concentrates.

³⁷ 'Financial and General Notes', *The South African Mining Journal*, Vol. 2, (27 May 1893), p. 545.

³⁸ ECI Hammerbeck, *Silver*, in CB Coetzee, *Mineral Resources of the Republic of South Africa*, 5th Edition, Handbook 7, p. 99.

³⁹ JSV van Zijl, *A Geological-Geophysical Investigation of the Albert Silver Mine North of Bronkhorstspuit, Transvaal*, Bulletin 43.

⁴⁰ LJ Robb, et al., *The Albert Silver Mine Revisited: Towards a Model for Polymetallic Mineralisation in granites of the Bushveld Complex, South Africa*, p. 1.

⁴¹ *Ibid.*, See also AT Champion, 'The Mineralogy & Related Geology of the Albert Silver Mine, Bronkhorstspuit, Transvaal'. Unpublished MSc dissertation, University of Natal.

There are no detailed records in the public domain of how much ore was produced during the life of the mine. Dr Henk Voet, formerly of Anglo American in an internal report cited in Robb, et al. states that some 20 000 tons of high graded ore were produced at an average grade of 1.14 kg per ton silver. This indicates that it was a very rich deposit, as it equates to about 2 280 kg of silver and with copper at an average of 10% per ton the production of metallic copper would have been in the order of 2 000 tons. In places the grade of the ore ran as high as 45 kg of silver/ton of ore.⁴² It is uncertain if the mine ever made a profit for the shareholders. It is known that it had debts when it was liquidated, but these may have been covered by the directors. The historical significance of the Albert mine for South Africa is that despite the eventual closure of the mine, it was the first serious attempt to work a silver rich deposit on a large scale.

It has been stated that the mining entrepreneurs – the Randlords – looked for new and potential profitable ventures wherever they could. Several of the future Randlords settled in Pretoria, purchasing farms to the east of the city. Harry Struben was one of the early gold mining pioneers of the Witwatersrand, destined to become one of those who – although he did not make the tens of millions of his contemporaries – certainly became a millionaire before he left Pretoria. He was one of the early landowners when he purchased the farm ‘The Willows’ in 1862.⁴³ It is mentioned extensively in his unpublished memoirs.⁴⁴ Harry and his family, including his brother Fred, all lived on ‘The Willows’. The farm is located just east of modern-day Silverton, ten kilometres east of the centre of Pretoria. Adjoining it are the farms Hatherly owned by Nellmapius and Zwartkoppies owned by Sammy Marks – Randlords already mentioned in

⁴² HW Voet, ‘Summary of exploration activities, 1885–1890’. Internal Report Anglo American Corporation Ltd, 1987. Cited in LJ Robb, et al. *The Albert Silver Mine Revisited: Towards a Model for Polymetallic Mineralisation in granites of the Bushveld Complex, South Africa*, p. 1. Anglo American was approached for a copy of this report, but I was informed that it was only available to Anglo employees. Henk Voet (now retired), in a telephonic interview, 25 February 2010, Johannesburg, stated that his report contained no strategic information and that he could not understand it not being released. Professor Robb, now at Oxford University, was also contacted by e-mail regarding the report, but in a reply dated 1 March 2010 stated he unfortunately no longer had a copy. It was decided to use the values given in Robb’s paper citing both paper and his source.

⁴³ For clarity in the text, the name ‘The Willows’ in inverted commas refers to the farm name and references to the mine are shown as: the Willows mine. References to the company are shown with the full name of the company.

⁴⁴ ‘Unpublished memoirs of Harry Struben’, Archive Guide no A116, File no A2.3.5 - Historical Documents Archive, William Cullen Library, University of the Witwatersrand, Johannesburg, p. 160.

connection with the Albert mine. To the north of Hatherly was the farm Nooitgedacht, destined to become the site of another important silver rich lead mine – the Edendale mine, the history of which will be discussed after that of the Willows mine. The remains of the Willows mine, in the form of surface workings or dumps no longer exist as the site was cleared in the late 1990s to construct the suburb of Nellmapius.

Deposits of copper-lead-silver ores were ultimately discovered in the 1880s and 1890s on a number of the farms that surrounded ‘The Willows’, and the cluster of mines and prospects in the area gave the town of Silverton its name. The finding of the veins on ‘The Willows’ actually predates those of the Albert mine by one year, but Struben did nothing with the discovery for over a year. What he had stumbled upon however - although he would never see the full development - was to become the Willows Copper (Argentiferous) Syndicate Ltd and the second richest mine in terms of tonnage of silver produced in the greater Pretoria region. The earliest reference to the Willows silver lodes appears in Struben’s memoirs:

While sinking a well on the bank of a river [Pienaars River], to erect a large noria⁴⁵ to lift water by ox power for irrigation at [the] piggeries⁴⁶ the miner struck a 4 foot vein of metal at the water level, which was declared to be silver, but I did not at that time attempt to work it. Later on argentiferous copper lodes were opened up higher up the rise.⁴⁷

It is not clear when the noria was constructed, as the extract is not dated, but by association of events in his memoirs it was probably 1883 or early 1884. The earliest dated reference to a lode on the farm is in a letter written by Harry to his nephew Godfray Lys, dated 29 June 1884. In the letter he says: “I am very busy nowadays, among other amusements I am sinking on a copper lode on ‘The Willows’...”⁴⁸

⁴⁵ A type of waterwheel with buckets attached to its rim for raising water from a stream or river into irrigation canals.

⁴⁶ Piggeries – a place where pigs are kept – a pig pen.

⁴⁷ ‘Unpublished memoirs of Harry Struben’, Archive Guide no A116, File no A2.3.5 - Historical Documents Archive, William Cullen Library, University of the Witwatersrand, Johannesburg, p. 160.

⁴⁸ ‘Extract of a letter from Harry Struben to Godfray Lys’, Archive Guide no A116, File no A2.3.3 - Historical Documents Archive, William Cullen Library, University of the Witwatersrand, Johannesburg.

Harry Struben sent samples to the Metallurgical Laboratory of the Royal School of Mines in London in 1884 and the analysis showed that he had a payable deposit of silver and copper on his farm. On the 23 June 1885 Fred Struben wrote a letter to Harry's wife, Mary. In part of the letter he writes:

You know I always said there was silver in the copper lode at The Willows, you will see what the assay shows. Stuff from 'The Willows', Copper 11.02 % Silver 100 oz. 5 dwt [pennyweight] 17 grs [grains] per ton of 2240 lbs. So you will see it is payable. Well done the old Willows...⁴⁹

The figures above also appear in a report referred to by Harry in his memoirs. The same report gave a value for the Struben's Confidence Reef (in modern-day Roodepoort) sample at 11.8 kg gold and 4.7 kg silver. It therefore appears that he was the first to mine silver in what became the Johannesburg region and by association, as a director of the Willows mine, to mine silver in the greater Pretoria area.⁵⁰

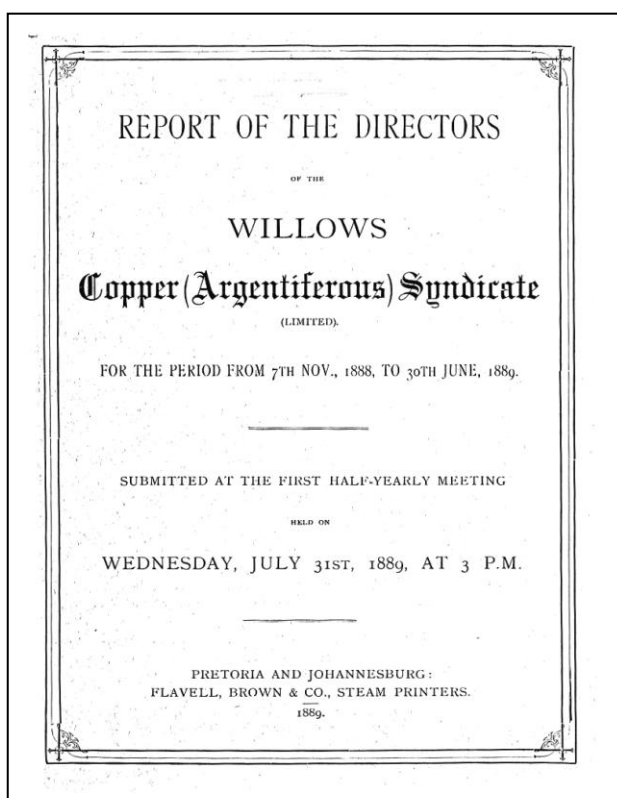


Fig. 3 Cover of the first half-yearly company report of the Willows Copper (Argentiferous) Syndicate Ltd, 1 July 1889.⁵¹

⁴⁹ A Cunningham, *The Strubens and Gold*, p. 44. These figures approximate to 300 g per ton of silver. It should be noted that Struben was referring to the farm 'The Willows' but the original quote has been retained.

⁵⁰ 'Unpublished Memoirs of HW Struben', Archive Guide no A116, File no A2.3.5 - Historical Documents Archive, William Cullen Library, University of the Witwatersrand, Johannesburg, p. 174.

⁵¹ First half-yearly company report of the Willows Copper (Argentiferous) Syndicate Ltd, 1 July 1889, Harold Strange Library, Johannesburg Public Library, Johannesburg.

Mary Struben's diary discusses the family selling and leaving 'The Willows' on or around 12 February 1887.⁵² Other than comments in his memoirs that he had tired of what early Johannesburg had become, Harry stated the reason for the Strubens' leaving for the Cape and then in the early 1890s for England, was to give their children the benefit of a better education.⁵³ Both Fred and Harry eventually divested themselves of their Rand interests and retired with modest fortunes.

The Willows Copper (Argentiferous) Syndicate, Ltd was formed in November 1888 to continue the Struben brothers prospecting and to mine the rich silver - copper lodes. The initial directors of the syndicate were Octavius J Skill, who was also cited as the mine manager, JWS Langermann - who would later become involved with H Eckstein & Co, then become President of the Chamber of Mines in 1909-10 - Harry W Struben, who was to resign within six months of the syndicate starting operations, and Edward F Simpson and JJ Hamilton (no biographical details have been found on Simpson or Hamilton).⁵⁴

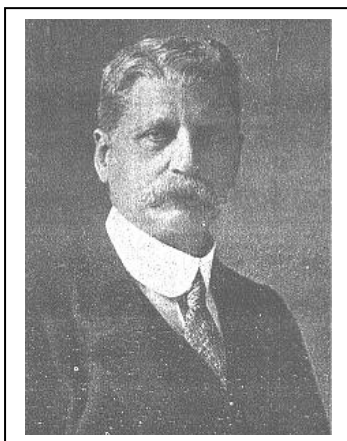


Fig. 4 JWS Langermann.⁵⁵

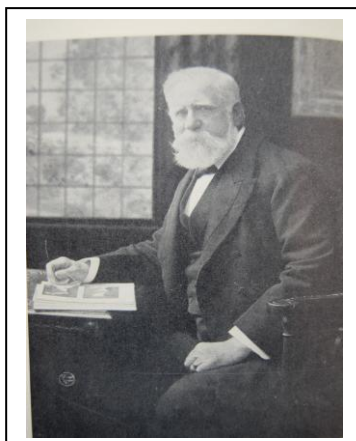


Fig. 5 Harry Struben.⁵⁶

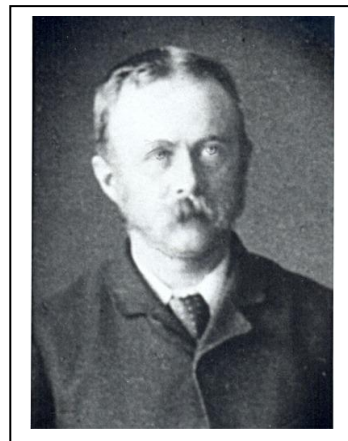


Fig. 6 Octavius J Skill.⁵⁷

⁵² 'Diary of Mary Struben, book 2', Archive Guide no A116, File no A1.1.2 - Historical Documents Archive, William Cullen Library, University of the Witwatersrand, Johannesburg.

⁵³ A, Cunningham, *The Strubens and Gold*, p. 121.

⁵⁴ CS Goldman, *The Financial, Statistical and General History of the Gold and other Companies of Witwatersrand, South Africa*, p. 258.

⁵⁵ JWS Langermann – photograph', *The South African Mining Journal*, (2 March 1910), p. 27.

⁵⁶ R Struben, *Taken at the Flood, the Story of Harry Struben*, p. 167.

⁵⁷ National Archives of South Africa, Pretoria. National Photographic Archive (NAREF) source TAB reference no. 9572. Note this photograph is an enlargement of a portion of a family photograph that is on file.

No prospectus has been found for the Willows mine and the first substantial details to emerge are in the 1889 report produced for the half-yearly Ordinary General Meeting of the shareholders. Two extracts from this rare eight page report are reproduced below, the other pages, (not reproduced); deal with the geology/mineralogy, assay and financial reports. From the sources it is clear that this company was a serious proposition from its inception, for Randlord participation. Among its later directors and shareholders are the names H Eckstein and his partner JB Taylor (their photographs appear later in the chapter).

Present at the meeting held on 31 July were JWS Langermann, AH Nellmapius, who was connected with the Albert mine and Julius Mosenthal. Mosenthal was a leading stockbroker and became involved in the development of the gold mining industry in Johannesburg. Julius was the son of Joseph Mosenthal, who founded the Mosenthal trading empire with his brother. Julius, however, was not involved in the family firm.⁵⁸

Very few sources were found on the activities of the mine around November 1888, when the mine was started. Regular shipments of ore were being made to Europe from early 1889,⁵⁹ and it would appear that a significant amount of mining had taken place, because they reported that not only had ore been shipped, but that they had 1 600 tons of ore on the surface.⁶⁰ This shows that the ore body must have been close to the surface and that mining may have been initially carried out using surface incline shafts rather than vertical shafts which would have needed hoisting equipment, (one such shaft was found during a pedestrian survey in 1995). The important factor is that initially the mining of ore was carried out at the same time as development. From the report it appears they intended to conduct smelting within a year of opening the mine, employing both a smelting expert from Europe and finalising plans for a smelting plant.

The report of the Directors is one of the few 1880s silver mining industry documents to have been found and it is included as figure 7, not only as an interesting document, but is the source of many of the discussion points raised below.

⁵⁸ Anonymous, *The House of Mosenthal – 1839-1939; A Brief History of a Century of Progress*.

⁵⁹ ‘Silver’ *The Diggers’ News*, 9 February 1889.

⁶⁰ Directors report in First half-yearly company report of the Willows Copper (Argentiferous) Syndicate Ltd, 1 July 1889, Harold Strange Library, Johannesburg Public Library, Johannesburg.

REPORT OF THE DIRECTORS
OF THE
WILLOWS COPPER (ARGENTIFEROUS) SYNDICATE
(LIMITED),

For the period from 7th November, 1888, to 30th June, 1889,

To be submitted at the First Half-Yearly Meeting, convened for Wednesday, July 31st, 1889, at 3 p.m.

To the Shareholders,

GENTLEMEN,—Your Directors beg to submit to you their first Half-yearly Report on the Syndicate's affairs, together with Balance Sheet and Profit and Loss Statement for the period from the 7th November, 1888 (the date of formation of the Syndicate) to 30th June, 1889.

- 1.—The Property acquired by the Syndicate consists of :—
 - (a) The Lease of a portion of the farm "The Willows," in the district of Pretoria, for a period of 25 years, from 30th April, 1888, free of rent, with the right of renewal for a further term of 15 years.
 - (b) The Machinery, &c., erected by the Vendors, the shafts and other workings developed on the Mine, and 2,700 tons of ore extracted from the different workings.
- 2.—During the period under review 1,608 tons of ore have been extracted from the Mine, of which 108 tons were shipped to Europe for treatment.
- 3.—The Accounts now submitted shew on Profit and Loss Account a debit balance of £34 12s. 2d.
- 4.—On reference to the Accounts, Shareholders will observe that the total charges of management and working the Mine amount to £3,763 10s. 5d.—deducting the charges attached to the Secretarial Department at Pretoria, the expenses of the flotation and establishment of the Syndicate, and the transport to and shipment of ore at Durban, Natal, amounting in all to £1,604 17s., included in the gross total of £3,763 10s. 5d.—some of the items whereof will not occur again, and the permanent items of which affect only the general expenditure of the Syndicate, it will be seen that the actual expenses incurred in working the Mine for the period of 8 months amount to £2,058 13s. 5d., giving the nett cost of mining the ore at £1 5s. 7d. per ton. As in the amount of £2,058 13s. 5d. is included a great deal of dead work, which need not be reckoned upon in the future, when once the Mine is properly developed, your Directors anticipate the cost of producing the ore at the Mine should be at the rate of about £1 per ton.
- 5.—The ore shipped to Europe for treatment has shewn fair results. From returns to hand it realised on an average in the gross £21 2s. per ton. The cost of transport, shipping, freight, reduction and agency amounts to £10 4s. per ton.
- 6.—Since the formation of the Syndicate the Directors, by virtue of the powers vested in them by the Trust Deed, have increased the capital of the Syndicate by the issue of 10,000 shares, which they disposed of for a sum of £50,000 in cash, thus bringing the available cash balance to be utilized in the development of the Mine up to £60,000, less a sum of £5,000 paid to the Vendor for machinery, workings, ore, &c. The balance of cash on hand amounts to over £44,000, and places the Syndicate in an exceptionally favourable financial position.
- 7.—As the cost of forwarding the ore to Europe and treating it there is over £10 per ton, your Directors intend for the future to reduce the ore on the Mine, and with that view have, through their agents in England, secured the services of a qualified Smelter, who is now on the way. The furnaces and works necessary for the purpose will be commenced immediately on his arrival here.
- 8.—Annexed hereto will be found an exhaustive report on the Mine by the Managing Director, dealing fully with the work done on the property in the past, its present position, and the course the Directors intend pursuing in the future for its proper development. The report also gives the machinery and labour employed at present, and what will be required in the immediate future.
- 9.—In the early part of the existence of the Syndicate your Directors had the property reported upon, and the reports furnished were of such a nature that they felt justified in inaugurating and continuing the development of the Mine upon a more extensive scale than that pursued by the Vendors. How far the results anticipated by your Directors are realised after the work of development has thus far progressed will be seen from the annexed reports by Mr. W. E. DAWSON, Pretoria, and Mr. J. KLIMKE, Johannesburg, who examined the Mine within the last few days.
- 10.—You are requested to confirm the appointment of Mr. H. L. SCHOLTZ as a Director of the Syndicate, who was appointed by the Board in the place of Mr. H. W. STRUBEN, resigned.
- 11.—You are requested to appoint two Auditors for the ensuing half-year, in the place of Mr. A. MACKENZIE and Mr. JAMES WHEELDON, who retire, but are eligible for re-election, also to fix their remuneration for the past half-year.

"The Willows," Pretoria, 22nd July, 1889.

(Signed)

EDW. F. SIMPSON, Chairman.
J. W. S. LANGERMANN, Director.
N. J. SCHOLTZ, Secretary.

Fig. 7 Part of the first half yearly report with many of the early financial and development details.⁶¹

Apart from the report of July 1889, no further director's reports have been located. In fact had it not been for the letter books of H Eckstein & Co Archives very little of the history of this mine could have been reconstructed. One factor that has not been found anywhere else other than the Directors report is the early need to raise additional working capital. It is discussed in more detail later when further injections of capital were necessary and one later source was found that gave all of the details. The

⁶¹ First half-yearly company report of the Willows Copper (Argentiferous) Syndicate Ltd, 1 July 1889, Harold Strange Library, Johannesburg Public Library, Johannesburg.

transcripts of the letter books yielded eighteen pages of complicated financial history and personality struggles.

Although the Directors report of July had mentioned the appointment of a smelter, in August 1889 it was reported that a competent smelter had been engaged and was on his way to South Africa. Mention is made in later correspondence that the smelter was a Mr Evans, but no further details have been found on him. It also stated that smelting equipment had been ordered and was soon to be erected at the mine.⁶²

Lionel Phillips, a partner in the firm of H Eckstein & Co was appointed to the Board of the Willows Syndicate in March 1890.⁶³ Inexplicably the appointment was short lived, and in December 1890 he offered his resignation.⁶⁴ It was during his time as a director, that correspondence with Alfred Beit in London indicates their main concerns were the operating costs and the impact of the rising amount of antimony in the ore. The financial viability of the Willows mine was always in question. The development of the stopes (mining areas) and the installation of the smelting furnaces would utilise virtually all of the operating capital and reduce financial reserves to extremely low levels on a number of occasions.

As the transporting of coal was a major cost factor Phillips felt they should try to influence the positioning of the new Delagoa Bay Railway (NZASM) in order to benefit the mine.⁶⁵ One problem with the suggestion was, however, noted by Phillips – namely that Kruger had interests in a number of farms along the proposed route and that it was therefore almost certain that Kruger's choices would prevail.⁶⁶ These points were discussed in chapter 1.

Two large quotes from a letter by Lionel Phillips dated 13 June 1890 are reproduced below, as they give a very good insight into the daily 'hands on' involvement and degree

⁶² 'The Willows' *Standard and Diggers' News*, 15 August 1889.

⁶³ Archives of H Eckstein & Co Ltd. Volume HE 146, Letter book of L Phillips, 11 March 1890, p. 107.

⁶⁴ *Ibid.*, 13 December 1890, p. 528.

⁶⁵ Archives of H Eckstein & Co Ltd. Volume HE 149, Letter book of L Phillips, 2 May 1890, p. 190.

⁶⁶ Archives of H Eckstein & Co Ltd. Volume HE 146, Letter book of L Phillips, 20 June 1890, p. 249.

of participation of the Randlords in their mining ventures. Note how the first part discusses the smelting operation and presents rough calculations of the amount of copper and silver they can expect to come out of the smelt. The fact that he has to give a definition of the term ‘matte,’ is also an indication that the directors, or at least some of them, were ignorant of precious base metal smelting technology:

One furnace has started work the second will be ready in 4 or 5 weeks. So far the smelting has been going satisfactorily and both Mr Jennings and the smelter (Evans) considered the test sufficient and pronounced the opinion that smelting can now be continued without interruption though some improvements in the mixture of the ore may be made. ...The ore is reduced to 10% that is to say out of 10 tons of say ore 1 ton of mixed silver, copper, iron, sulphur etc. remains in the furnace, the remainder being drawn off as slag. The residue or “matte” as it is called, Mr Jennings estimates to contain 400 to 500 ozs of silver and 25% to 30% copper. Roughly speaking a ton of “matte” is worth £100 and represents the general yield of the Willows in Mr Jennings opinion so far as about 50 ozs silver and 3% copper.⁶⁷

The letter also contains a detailed warning that working capital was running low again, a problem that continually plagued the company, however, the letter continues on a buoyant note, with high expectations of large profits. Interestingly there is a warning regarding the “fluctuating silver market”, one of the few such references to the volatility of the product that they were mining:

Mr Jennings estimates that when the two furnaces are working they will produce about 1½ tons of matte per diem producing a net return of £3,000 a month. The second furnace will not however contribute before August, and by the beginning of that month the advance offered by Mr Skill would be exhausted. ...Once having solved the coal problems it should be possible, (though perhaps difficult principally owing to proportional admixture of carbonates, oxides and sulphides being necessary) to raise and treat 200 tons a day. This should yield 10 000 ozs of silver and 6 tons of copper worth £2 300. With expenses of £5 per ton a net profit of £9 000 would result...It is principally a question of coal supply and development with perhaps some regard to the fluctuating silver market. Putting the quantity at half however, the annual profits would be £230,000...⁶⁸

The letter cited above also covers other operational problems [not cited] which Phillips was clearly concerned about. One of the greatest, being the obtaining of sufficient coal of a quality suitable for the smelting, this was a concern that is mentioned in many of his

⁶⁷ Archives of H Eckstein & Co Ltd. Volume HE 149, Letter book of L Phillips, 13 June 1890, p. 239.

⁶⁸ *Ibid.*

letters during this period. Skill came up with an idea to use the money from the sale of ore to fund further underground development rather than produce a return for the shareholders, but Phillips was against this idea. Phillips knew that without shareholder confidence and a return on their investment, that there would be no further financial support from the shareholders, or possibly the banks, if they felt that shareholder confidence was poor. It appears though, that Skill was planning his own 'hidden agenda' of development first and return on investment second, assuming funds were available. Skill's 'agenda' seems to have been to get the mine to a stage where it was fully developed, but financially cash strapped. Then by offering to work it on tribute, Skill would have the benefit of working a developed mine from which he could mine the ore and sell at high profit for himself, with only the small tribute fee going to the company. The development of this hypothesis is expanded on below.

Phillips often wrote to Beit that the prospect for more 'silver farms' - a phrase commonly used in the letter-books - were good, but the economic depression of 1889–1890 was worrying. In the following extract is a reference by Phillips to the potential of silver mining becoming a large industry:

Now that silver is so much talked of I have numbers of properties offered, but have so far taken up nothing beyond the farm Groenfontein.⁶⁹ There seems nevertheless a great deal of silver scattered about in the direction of the Willows and Transvaal mines, and there is every probability of it becoming a large industry. In the face of the existing depression do you think money will be forth coming?⁷⁰

Earlier in the text it was mentioned that two extracts from the 1889 company report had been included because they were rare historical documents from the period. The second document, which has been edited, is reproduced as fig. 8 below. Very little of the correspondence presents any more than brief mentions of development. The best description of the mine is in the manager's report of 1889, it has been included here to show the extent to which companies reported on their underground development in the 1880s, providing details of the lodes, as well as the surface structures, the numbers of staff employed and their positions and in this case demonstrates that this was a mine of

⁶⁹ This farm is mentioned in Table 1 in the southeast area mines.

⁷⁰ Archives of H Eckstein & Co Ltd. Volume HE 149, Letter book of L Phillips, 20 June 1890, p. 249.

substance. Also mentioned in the report was that development had exposed 8-10 000 tons of ore 'in sight' a considerable tonnage of ore both to mine and smelt.⁷¹

THE WILLOWS COPPER (ARGENTIFEROUS) SYNDICATE, LIMITED.

MANAGER'S REPORT for the period ending 30th June, 1889.

To the Chairman and Directors.

GENTLEMEN,—I beg to report on the taking over the works on the 7th November last, it was thought advisable to continue the prospecting and developing of your property for some months, before commencing to sink Main Shafts on the various Reefs, in order that the best positions should be discovered for sinking to the best advantage for working this extensive property.

The principal work was done on No. 2 and No. 4 Reefs for the first six months.

On No. 2 Reef a shaft 9 by 4 was sunk to the North of Lode to the depth of 80 feet, carrying down a Leader about 18 inches wide in same to the 50 feet level, producing ore assaying copper 10% and 200 ozs. silver. On 50 feet level the Leader passed into the wall of shaft on the north. On the 80 feet level, strong water was struck, which entirely stopped sinking in shaft. We then drove 30 feet to the north on this level, and cut our leader about 2 feet in, carrying sulphide of copper and silver with carbonate of iron as gangue, about same thickness as when leaving shaft on 50 feet level. Six feet further in, we struck another Leader 10 inches wide, also carrying same ores, although not so rich in silver. To the end of this drive small leaders were struck. To the north of the two larger leaders in this drive we sunk winze 20 feet to avoid the water to the 100 feet level. On this level we drove to the south 19 feet under our shaft, cut one of the leaders and then met with the limestone rock, which was an immense expense to get through. We intended driving still further south to strike the Main Reef, but the heat compelled us to stop. We are now raising from this level to meet our 80 feet shaft to get air, and then we propose continuing our drive south on the 100 feet level to catch Main Reef. We also drove 9 feet east on one leader on this level, and find the sulphide ore continuing. So soon as the shaft is open to the 100 feet level, we propose sinking to the 150 feet level as well as driving to the south on 100 feet level. We have commenced our Main Shaft (12 feet 9 in. by 6 feet 3 in.) about 70 yards to the east of developing shaft, and midway between No. 2 and No. 3 Lodes to serve both lodes, now down about 25 feet, and timbered throughout with 6 x 6 in. pine and 1½ in. lagging. We propose on 70 feet level driving to connect No. 2 and No. 3 Lodes to enable us to extract all our rich carbonate ores existing above this level, as proved by the old shaft 65 feet deep and old levels driven by the old Syndicate before we took over the property, ore from which workings realized as delivered on bank in Swansea the return of £25 per ton. An 8-horse power Clayton-Shuttleworth Engine with auxiliary gear drives a 4-inch Cornish pump, and does the hauling for both the developing and new main shaft. A 6-horse power Engine, driving saw-bench in shop, also takes steam from this engine.

On No. 4 Lode a shaft 8 feet by 5 feet partially timbered has been sunk to the south of outcrop which struck the Lode at the 66 feet level, the ore being good on this level; we have driven in the lode to the east 121 feet, and found the ore good and the lode an average width of 3 feet, and have driven to the West 321 feet. First 20 feet the lode was about 2½ feet, then for 30 feet the lode contracted, and we continued driving in the footwall until we reached the open section, and from here we have driven in reef to the West 146½ feet, the reef averaging from 4 feet to 5 feet in thickness, and very good ore. We have also sunk an incline shaft 53 feet on the lode to the west about 120 yards from Main Shaft, and as soon as our west drive reaches this, we shall get air for a further westerly development. We are also sinking an incline shaft on lode about 120 yards from Main Shaft to the east, for air shaft—present depth 20 feet. We propose sinking air shafts every 100 yards on reef to answer as winzes and air shafts. There is a parallel lode about 50 yards to the north from No. 4, and we propose sinking a main shaft 13 feet by 6 feet 3 inches between, to serve both reefs. We have driven about 100 feet cross-drives on 66 feet level to test leaders coming in on this level.

We have landed at grass about 1,608 tons reef from our developing works on this lode. Since the Syndicate started about 160 tons of the higher grade ore has been picked from dump, of which 108 tons have been shipped, 30 tons now in bags waiting transport, balance will be bagged soon as dry. From two to three hundred tons more could be picked from ore floors for shipment if it is decided to continue this practice. I may add that higher grade ore has been coming to bank within the last two weeks from this lode than ever before since the Syndicate started. On the main drive we have now in sight above us from 8 to 10 thousand tons of ore. A 6-horse Robey Engine, with auxiliary gear, does all the hauling and pumping from this developing work on this lode.

On No. 1 lode we have sunk main shaft 10 ft. by 5 ft. 6 inches inside, thoroughly timbered, to the south of reef at the extreme west end of the outcrop, being lowest ground we considered we should drain reef by this means. The shaft is down 60 feet, but the water is very strong, and the limestone rock which we have entered very hard, so that our progress is very slow. We hope to cut reef at 70 feet level, and then find better sinking rock in foot wall. We propose making a level in lode when struck, and then push main shaft down for the 150 and 300 foot levels.

We have a 10-H.P. Robey Hauling Engine with 6-inch Cornish pump, with auxiliary 4 inch pump—first-class gear for this shaft. About 100 yards to east of main shaft we are sinking incline shaft on lode to serve as "winze" and air shaft, present depth about 25 feet—good ore coming to bank. About 800 yards to the east we have sunk shaft south of reef and struck it at 35 feet, lode about 10 feet wide, but not high grade. From our main shafts on Nos. 1, 2, and 4 lodes we should be able in a short time to send to bank any quantity of good ore for shipment or the furnaces.

Our buildings for single men are completed, and comprise 12 rooms in one block, each 10 feet by 10; besides which we have three double cottages nearly completed to accommodate six families, several small houses for engineers, large store house, and suitable offices for works, also magazine (10 feet by 12). Mess-room, kitchen and offices are commenced.

The Directors have called for tenders for suitable machinery for our three main shafts, comprising 40 horse-power boilers and engines, fitted with air-compressors and rock-drills. With this plant I consider we shall be in a position to carry our works to any depth required.

(Signed) O. J. SKILL.

"The Willows" 23rd July, 1889.

Fig. 8 Manager's report for July 1889 (partially edited) presenting details of development and staffing.⁷²

Considering the size of the mine, the numbers employed would appear to have been extravagant – 10 miners, 1 timberman, 6 engine drivers, 2 mechanics, 2 blacksmiths, 1 carpenter, 50 black workers and 6 managers - a total of 78 men. A second report on the

⁷¹ 'In sight' is a mining term, which refers to the approximate amount of ore that had been opened up for mining by the underground development.

⁷² First half-yearly company report of the Willows Copper (Argentiferous) Syndicate, 1 July 1889, Harold Strange Library, Johannesburg Public Library, Johannesburg.

mine and surface structures featured below, appeared in 1892, and the comparison with the above gives some idea of where the capital was squandered, rather than in making profits for the shareholders. It gives an additional indication of the development of the mine's infrastructure:

Workings: Two level opened on 3 lodes; on No 4 Reef first level opened for about 1 200 feet, second for about 150ft. On no 2 Reef first level opened for 400 ft, second for about 200 ft. (first level is 70ft vertical, second is 150 ft.) dip about 65°; on No 1 Reef first level opened for 120ft. second level about 65 ft; above levels are driven in ore; width of lode may be taken as 3ft. 5 vertical shafts, 3 of which are 3 compartment main hauling shafts.

Surface works: 3000ft of tramway, offices, 3 double stables, cottages for married men, boarding house and dwelling house for single men, 5 engine houses, machine shop, carpenters' shop, blacksmiths' shop, furnace building containing two 20 x 40 ft reverberatory furnaces, managing director's house and two homesteads.⁷³

Sidney Jennings, whose position at the mine has not been clarified, was an American mining engineer and brother of Hennen Jennings the more famous mining engineer of the two of them. Hennen Jennings was appointed as consulting engineer to H Eckstein & Co, and was heavily involved with the Argent Silver Mines Ltd in the 1890s. In the July 1890 director's report, it appears that OJ Skill was the managing director of the Willows with R Meggy as clerk of the works, a person by the name of Mckinlay was the mining manager [underground manager] and Ellis the chief engineer. The smelter was a man by the name of Evans, although his name appears only once in the sources and it is not clear if he was replaced by Sidney Jennings. No mention is made of Sidney Jennings in the Director's report and it has to be assumed that he was appointed either in the latter half of 1889 or early 1890. His name is mentioned in a letter by Phillips in April 1890. Skill's position is not without some questions either, in the first report to the directors he signed the mine manager's report, but at the same time he was also a director and by 1890 he is cited as the managing director.⁷⁴

The mine was well subscribed and a healthy company for its time, however, working capital was always a problem. It would seem the primary cause in this case was over-

⁷³ CS Goldman, *The Financial, Statistical and General History of the Gold and other Companies of Witwatersrand, South Africa*, p. 259.

⁷⁴ First half-yearly company report of the Willows Copper (Argentiferous) Syndicate Ltd, 1 July 1889, Harold Strange Library, Johannesburg Public Library, Johannesburg.

development of the ore body instead of mining and shipping of the ore. The original capital value of the syndicate was £100 000, of which £10 000 was working capital. At the beginning of 1889 a share issue of 10 000 shares at £5 a share was used to raise the working capital to £60 000. By the middle of 1890 the working capital was exhausted and a loan of £15 000 was raised in England. In June, Skill offered a further loan of £10 000 and this was accepted by the Board.⁷⁵ By October 1890, Eckstein had advanced a further £5 000.⁷⁶ Skill offered to lend the Company 10 000 of his shares to raise additional capital, until the smelting furnaces were commissioned and they began to yield the returns from which the loans could be repaid and a profit made.⁷⁷ Once again Skill appears to have had a 'secret agenda' for advancing the loan of £10 000, perhaps as another step to gain financial control of the mine. Although the evidence is purely circumstantial, the letter books of Phillips, Beit, Eckstein and Taylor imply that Skill was always expecting the firm of H Eckstein & Co to produce the working capital or loans for the Willows mine.⁷⁸ Skill would offer money for operating capital, but they would have to pressurise him into producing the money.

In August 1890 Phillips was asking Jennings what affect the element antimony had on the value of the shipped ore and matte. The assays of the matte were showing a percentage as high as 36% antimony, with copper at 45% and silver 12.87 kg per ton. Jennings stated that antimony had the effect of reducing the value of the copper ore by as much as 10/- per ton per each percentage of antimony.⁷⁹ In the same month a vein of ore 30 cm wide was struck at a depth of 25 m from the surface. The ore assayed silver 10.77 kg per ton but with a lower percentage of copper. The sulphur values were high at 11% and at the same time the ore contained an increased amount of antimony, thus reducing the value of the ore even more.⁸⁰

⁷⁵ Archives of H Eckstein & Co Ltd. Volume HE 149, Letter book of L Phillips, 27 June 1890, p. 259.

⁷⁶ *Ibid.*, 11 July 1890, p. 285.

⁷⁷ Archives of H Eckstein & Co Ltd. Volume HE 56, Letter book of L Phillips, 17 October 1890, p. 355.

⁷⁸ *Ibid.*, 10 October 1890, p. 347.

⁷⁹ Archives of H Eckstein & Co Ltd. Volume HE 149, Letter book of L Phillips, 9 August 1890, p. 308.

⁸⁰ *Ibid.*, 16 August 1890, p. 317.

By September it was realised that there was a discrepancy between the assays of the ore and the matte. Jennings was asked to explain the variance and in letters to Phillips replied that new furnaces absorb the matte [into the furnace bricks].⁸¹ Eissler, a world renowned silver metallurgist of the time, confirmed this in conversation with Phillips. It has to be assumed that this Eissler was the same person who in 1889 was appointed as the mine consulting engineer of the Albert mine. Eissler stated that he had known furnaces to absorb as much as 30-40 tons of matte before the smelt values increased.⁸²

The sources revealed that there was friction between Skill and Sidney Jennings. In a letter to Beit on the 17 October 1890, Skill states how he had put Jennings on 'holiday,' a euphemism for suspension. Skill then appears to have unilaterally taken over as general manager of the Willows operation.⁸³ Was he the mine manager – general manager or managing director? This constant changing of managerial title makes it difficult to know what position Skill held.

Skill reported that he had found the 'missing matte' in the bottom of the furnaces in November. When it was broken up it assayed silver at 34 kg per ton and 90% copper.⁸⁴ There was a request by Beit for the values of assays of the ores and this coincided with the finding of the huge values of smelted products in the bottom of the furnaces. They actually have no connection and could, with hindsight, be interpreted as evidence of Skill's disinformation to the Eckstein Company aimed primarily to discredit Jennings. There appeared to be a problem in the efficient operation of the furnaces. Sydney Jennings and the low thermal efficiency of the coal were the main reasons given by Skill for it. The result, Skill argued, was poor smelting and low returns of silver and copper compared to the mine assays.⁸⁵ Obviously there was a smelting problem, but the removal and dismissal of Jennings appears from the correspondence to be more a clash of personalities, than of technical incompetence. In the same letter that Skill states that he has put Jennings 'on holiday', he also states that he has purchased coal "...which gives

⁸¹ Archives of H Eckstein & Co Ltd. Volume HE 149, Letter book of L Phillips, 6 September 1890, p. 346.

⁸² *Ibid.*, 13 September 1890, p. 356.

⁸³ Archives of H Eckstein & Co Ltd. Volume HE 56, Letter OJ Skill to A Beit, 17 October 1890, p. 355.

⁸⁴ *Ibid.*, 21 November 1890, p. 357.

⁸⁵ *Ibid.*, 17 October 1890, p. 355.

much better results.”⁸⁶ Was Jennings forced by Skill to purchase inferior coal, or did Skill capitalise on Jennings’ knowledge of a better source of coal after his suspension? Jennings was definitely the engineer and so would have had the required knowledge to select the correct coal, something which Skill and his lack of such training could not have done.

Skill managed to convince Hermann Eckstein that Jennings must go, and he was advised to arrange it on the best terms possible. It seems that the method used to force Jennings out, was to get him to a point where he walked out after being advised that he was to be discharged. When Skill dismissed Jennings in December 1890 he described him as an ‘ordinary manager.’⁸⁷ This treatment would almost certainly have been unacceptable to a man of Jennings’ training, but unfortunately for him it was used against him when he tried to obtain his contractual four months’ salary on release from the company’s service.⁸⁸ It is interesting to note that he had not lost face with Phillips and Eckstein, because a few months later he was given a position as assistant general manager of De Beers Consolidated Mines in Kimberly for a few years. Then in 1893 he became assistant consulting engineer to the H Eckstein Group as well as general manager of the Crown Mines Gold Mining Company (see biographical notes).

In numerous letters Phillips, Taylor and Eckstein expressed their distrust and frustration with Skill. In January 1891 Taylor wrote in a letter that Skill had rejected their (H Eckstein & Co) figures as to the profitability of the mine and that “...Skill has conveniently got rid of Jennings to have no unpleasant truths given out.”⁸⁹ Another piece of evidence against Skill is that once he took over from Jennings he appeared to work poor or low-grade ore. Was he trying to get the mine to fail financially or be of little value in order to take it over? It is unclear exactly how much mining or smelting took place in 1891, but from July of that year most of the letters deal with an offer from Skill to the Willows Company, to take the mine over on a tribute basis. In early 1892 Skill again offered to work the mine on tribute, because once again, the Willows

⁸⁶ Archives of H Eckstein & Co Ltd. Volume HE 56, Letter OJ Skill to A Beit, 17 October 1890, p. 355.

⁸⁷ Archives of H Eckstein & Co Ltd. Volume HE 56, Letter OJ Skill to A Beit, 21 November 1890, p. 357.

⁸⁸ *Ibid.*, Letter S Jennings to R Meggy, 1 December 1890.

⁸⁹ Archives of H Eckstein & Co Ltd. Volume HE 189, Letter Book of JB Taylor, 16 January 1891.

Company had no operating capital. Such a tribute agreement would have been disastrous for the shareholders, because the revenue earned from the operation would have gone to Skill, even though he was using the shareholder's assets. In fact Taylor raised just such a concern earlier in 1890, at Skill's first offer to operate the mine on tribute. Taylor enquired why rich areas were being ignored for the poorer sulphide ore bodies, but he never received a reply.⁹⁰ It is known that Skill was a claims broker in Kimberley, not a mine manager or smelter, and this brings into question his abilities at the Willows mine.⁹¹ His own apparent incompetence comes through, when the mining operation under his control is analysed.

The capital had been raised from the original £100 000 in 1889 to £120 000 in 1890. Between 1890 and 1891 the Syndicate spent approximately £85 000 developing the property. They built a large number of accommodation and mine buildings including a large house for the managing director/mine manager – Skill. They also installed both mining and reduction machinery and commissioned two smelting furnaces.⁹² As the mine deepened, the percentage of antimony in the ore increased and the reduction works was not designed to cope with this increase. This led to inefficient smelting and a copper matte that had significant antimony content that in turn led to a lower price being paid for the matte.

In January 1891 JB Taylor, in a letter to Hermann Eckstein, wrote about the starting of regular smelting operations at the mine and reported on the potential production and income:

No 1 furnace two charges a day on 5 tons of ore is smelted daily by the furnace yielding 400 lbs of matte which Skill values at £125 per ton of 2000 lb matte or yielding £25 per diem having 26 working days averages £650 per month – The monthly expenses are now £1500... The second furnace will be ready by 1 February and from then the expenses will be increased by £500 per month.⁹³

⁹⁰ Archives of H Eckstein & Co Ltd. Volume HE 189, Letter Book of JB Taylor, 16 January 1891, p. 31.

⁹¹ M Fraser, *Some Reminiscences* – Lionel Phillips, p. 210.

⁹² WL Speight, 'Silver in the Transvaal', *The South African Mining and Engineering Journal*, (14 December 1956), pp. 1001-1003.

⁹³ Archives of H Eckstein & Co Ltd. Volume HE 189, Letter Book of L Phillips, 16 January 1891, p. 31.

The monthly reports continued through the first half of 1891 in much the same manner reporting tonnages of copper produced which averaged 4 tons of copper and 100 kg of silver per month.⁹⁴



Fig. 9 JB Taylor.⁹⁵



Fig. 10 Hermann Eckstein.⁹⁶

During the second half of 1891, the collapse and destruction of one of the smelting furnaces was blamed on an exceptionally wet rainy season. Owing to the depressed state of the silver market, the company was unable to raise fresh working capital for repairs and an offer was made to work the property on tribute, which was accepted. It is assumed that this is the offer made by Skill as no other offers to operate the mine under tribute are named in any of the sources. The lease was for a period of 2½ years, with an option of renewal for a further 2½ years at a rental of 10% of the net revenue from the ore or matte sold.⁹⁷

What went wrong with this mine? By August 1891 the papers were calling it ‘a shaky syndicate’, it had debts of £27 000, and was unable to raise a further loan, however, an

⁹⁴ ‘Willows Mine Pretoria,’ *Standard and Diggers’ News*, 16 February 1891. See also ‘Willows Silver Co,’ *Standard and Diggers’ News*, 2 March 1891. See also ‘Willows Copper,’ *Standard and Diggers’ News*, 30 May 1891.

⁹⁵ Emslie, TS, (ed), *Lucky Jim – Memoirs of a Randlord by JB Taylor*. Cover photograph.

⁹⁶ *Ibid.*, p. 83.

⁹⁷ CS Goldman, *The Financial, Statistical and General History of the Gold and other Companies of Witwatersrand, South Africa*, p. 258.

offer had been made by Skill to work the mine on tribute.⁹⁸ For months there was a constant argument between Skill and Taylor about the terms of any tribute lease. At the heart of it Taylor wanted the advances paid by H Eckstein & Co to be repaid before Skill took over the mine on tribute. Right up to the time the mine did go into liquidation they were constantly trying to get their advances of £8 300 repaid. They also wanted an independent stock take of all assets. In the end they got neither.⁹⁹

At the beginning of 1892 Eckstein wrote to Beit that Skill still wanted to continue on the property for twelve months on a tribute basis, however Eckstein was concerned that if Skill failed "...the world would know and the property would be valueless."¹⁰⁰ In February 1892 it is reported that the company had accepted the offer of its manager OJ Skill to operate the mine on tribute from 1 November.¹⁰¹ Most of the correspondence on the Willows in the letter books of 1892 deals with Skill accepting a lease, and then declining the lease.¹⁰² By April 1892 there is mention of possible liquidation of the Willows Company, but in June Skill finally signed a twelve-month tribute lease.¹⁰³ In a strange twist of fate, Skill dies of 'inflammation of the lungs,' on 3 September 1892 leaving a wife and three young children.¹⁰⁴

There is no clear indication of what mining activities, if any, took place at the Willows mine after the death of Skill. In part of a letter dated 14 December 1893 to H Eckstein & Co Beit wrote "...if the thing [Willows] goes for a song I think we should buy it."¹⁰⁵ In December 1893 the mine went under auction and Beit recommended buying it, as the mine owed H Eckstein & Co £5 000 or more. His advice was ignored and the mine was liquidated in July 1894. In November Beit wrote that he was astonished that the mine

⁹⁸ 'A shaky syndicate', *Standard and Diggers' News*, 12 August 1891.

⁹⁹ Archives of H Eckstein & Co Ltd. Volume HE 190, Letter book of JB Taylor, 8 September 1891, pp. 471-472.

¹⁰⁰ Archives of H Eckstein & Co Ltd. Volume HE 193, Letter book of JB Taylor, 30 January 1892, p. 306.

¹⁰¹ 'Willows Argentiferous', *Standard and Diggers' News*, 26 February 1892.

¹⁰² Archives of H Eckstein & Co Ltd. Volume HE 193, Letter book of JB Taylor, 22 March 1892, p. 214.

¹⁰³ *Ibid.*, 18 June 1892, p. 146.

¹⁰⁴ *Ibid.*, 3 September 1892, p. 15.

¹⁰⁵ Archives of H Eckstein & Co Ltd. Volume HE 59, Letter book of JB Taylor, 14 December 1893, p. 219.

was sold for only £200.¹⁰⁶ Two sources in the National Archives deal with the liquidation of the Willows Copper (Argentiferous) Syndicate, Ltd. It is clear from one of the files that the company had no liquid assets by 1894.¹⁰⁷ Why H Eckstein & Co did not bid for the mine has not been resolved. Nothing appears in the letter books of the company to explain the apparent lack of interest. The mine was re-opened on a small scale in 1907, however, lack of funds and mismanagement restricted development.¹⁰⁸ In an attempt to locate the mine workings on the farm 'The Willows' the only source that gave any details such as GPS readings was a SAMINDABA report by the Council of Geoscience.¹⁰⁹ Remains of shafts and trenches were found during a survey in the early 1990s. As was stated in the introduction to the Willows mine the remains of mining activities no longer exist on the farm 'The Willows' as the area was developed in 1997 into Nellmapius, a housing suburb of Silverton. At the same time that the Willows mine was in decline the political situation in the ZAR was deteriorating significantly in the period up to the Jameson Raid at the end of 1895.

It has been mentioned that the finding of silver rich deposits of copper, at what became the Albert mine in 1885, led to a rush by prospectors in the late 1880s to the greater Pretoria region, in search of other similar rich deposits of silver. The third deposit to be discussed in this chapter was found on the farms Franzpoort and Nooitgedacht, just north of the farms Hatherly and 'The Willows'. No records have been found of who prospected and found the argentiferous lead deposit on the farm Franzpoort. It is clear from a pedestrian survey of the farm in 2008 that prospecting was carried out. There are trenches and several areas where dump material exists. During the research of sources it became clear that the mine generally referred to as the Edendale mine was going to have a very complicated history because of the many name changes that it went through

¹⁰⁶ Archives of H Eckstein & Co Ltd. Volume HE 60, Incoming letter book A Beit, 16 November 1894, p. 163.

¹⁰⁷ National Archives of South Africa. Depot TAB. Source: ZTPD. Volume 8/395, Ref 6761/1894, Opposed Application. JN De Jongh versus De Willows Copper (Argentiferous) Syndikaat Bpkt, 1894. See also file Source: ZTPD. Volume 8/409, Ref 709/1894, Ex Parte Application. Liquidateuren van het Willows Copper (Argentiferous) Syndicate Ltd, 1894, and Source: ZTPD. Volume 8/420, Ref 7276/1894, Ex Parte Application. Liquidateuren van het Willows Copper (Argentiferous) Syndicate Ltd, 1894.

¹⁰⁸ Council for Geoscience, Pretoria, S Van Biljon, 'Geological Report on the Willows Silver Mine, Pretoria District', Report No 1938-0027, 1938, p. 2. See also 'Pretoria Silver, Lead & Copper ores', The South African Mining Journal, (19 September 1908), p. 80.

¹⁰⁹ JEJ Martini, SAMINDABA Doc ID 1159 & Doc ID 1160 for farm The Willows 340 JR, Pretoria district, (Pretoria: Council of Geoscience, 1985).

in the eighty years of its existence. The table below lists the two farms, the operating names of the mine and years of operation in an attempt to clarify the picture.

Table 3 Mining companies operating at the Edendale mine

| Company | Farm | Operating years |
|-------------------------------------|--------------------|-----------------|
| Franzpoort mine | Franspoort 332 JR | 1890 - 1898 |
| Edendale Lead Mines Syndicate Ltd | Nooitgedacht 333JR | 1894 - 1905 |
| Edendale Estates Ltd | Nooitgedacht 333JR | 1903 - 1909 |
| Donerhoycul Tributing Syndicate Ltd | Nooitgedacht 333JR | 1911 - 1914 |
| Edendale Inspection Syndicate | Nooitgedacht 333JR | 1918 - 1919 |
| Edendale Developing Syndicate Ltd | Nooitgedacht 333JR | 1920 - 1923 |
| The Edendale Lead and Zinc Co Ltd | Nooitgedacht 333JR | 1935 - 1937 |
| Union Lead Mine | Nooitgedacht 333JR | 1937- 1938 |
| Union Lead and Silver Mines Ltd | Nooitgedacht 333JR | 1938 - 1941 |
| Edendale Lead Mines (Pty) Ltd | Nooitgedacht 333JR | 1949 - 1974 |

By linking the names to the farms, it is possible to show that they are the same mine under different names and - presumably - management. The only anomaly is the Franzpoort mine which can easily be explained, as the farm Franspoort (note different spelling for the mine and farm) shares a common eastern boundary with the farm Nooitgedacht. Prospecting in the 1890s revealed deposits on both farms and they were both developed, but the Franspoort one was ultimately abandoned. The name Edendale may be the attempted Anglicisation of an earlier name ‘Uitendal,’ whether this refers to the mine name or the possible farm name or portion is unknown.¹¹⁰ The causes of further confusion were references to Number 1 or 2 mine and number 1 or 2 shafts.

During the research it became clear that there were two mines on opposite sides of the Cullinan road R513 and both had a number of shafts, although only one main shaft on each mine appears on the plans. The ‘Number 1 mine’ appears to date from the pre- and post-1900 period and the ‘Number 2 mine’ from 1907 to the 1940s. It seems most likely that the Number 1 mine is the mine that is on the portion of the farm Nooitgedacht that adjoins the farm Franspoort, where it is known that prospecting occurred in the 1890s. There is no plan clearly defining which mine or portion of the mine is Number 1 and which is Number 2. What is clear though is that the reduction and smelting plant was located on the Number 1 mine and the lack of such structures at the site of the Number 2 mine indicates that the reduction and smelting remained at the Number 1 mine.

¹¹⁰ Archives of H Eckstein & Co Ltd. Volume HE 234, file 71E Edendale no 1, 19 March 1903.

A photograph of the mine with the label ‘Silver mine Nooitgedacht 1892’ exists.¹¹¹ It is believed that the date is in error and is more likely 1922. It shows a portion of the rail track that from knowledge of the area, would appear to be the embankment between Number 2 and Number 1 mine. As the Number 2 mine did not exist in 1892, this would rule out such an early date for the photograph.

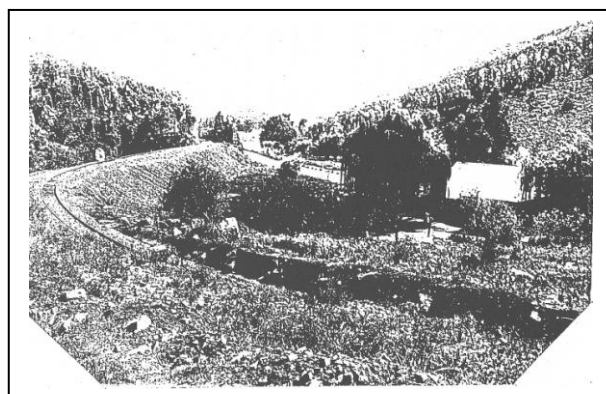


Fig. 11 Early photograph of the Edendale mine labelled ‘Silver mine Nooitgedacht 1892’ – note the rail-lines on the left side.

Two references to the Edendale mine date from 1898. The first indicates that the prospecting work on Edendale had lain idle for months, but that work on the adjoining farm Franspoort was continuing.¹¹² The second reference on 14 May 1898 detailed the first AGM of the Edendale Lead Mines Syndicate Ltd.¹¹³ From the report it would appear that there was personal enrichment by the original directors in that they collected a director’s fee twice what it should have been, and the company secretary was ordered to obtain refunds of the overpaid amounts.¹¹⁴

According to letters and reports in the H Eckstein & Co Archives, output from the Edendale mine in the 1890s was 700.5 tons of lead ore.¹¹⁵ The syndicate most probably ceased to exist just before or during the Anglo-Boer War of 1899–1902. From letters in the H Eckstein & Co Archives, it appears that the mine was offered to H Eckstein & Co in the early 1890s, having been inspected under the name ‘Franzpoort’ by the consulting engineers Hennen Jennings, in July 1890, and A Wilkinson, in November 1891. In both

¹¹¹ Silver mine Nooitgedacht 1892, [possibly incorrect date] Ref 622 Silver Mining, Harold Strange Library, Johannesburg Public Library, Johannesburg.

¹¹² ‘Pretoria’, *The South African Mining Journal*, Vol. 7, (22 January 1898), p. 379.

¹¹³ Registrar of Companies, Pretoria, File 05/32966/07, Edendale Lead Mines Syndicate Ltd.

¹¹⁴ ‘Edendale Lead Mines Syndicate’, *The South African Mining Journal*, Vol. 7, (14 May 1898), p. 702.

¹¹⁵ Archives of H Eckstein & Co Ltd. Volume HE 234, file 71E Edendale no 1, 19 March 1903.

cases it was declined, because of doubts about the viability of the mine. In a letter dated 27 August 1904, from the H Eckstein & Co Archives, it states that at the time of the inspections “...the Lode was only exposed in some surface trenches and shafts not exceeding 20 feet deep.”¹¹⁶

A new company, the Edendale Estates Ltd,¹¹⁷ was floated in September 1903 with a capital of £120 000, which was increased to £200 000 in January 1904. The Edendale Estates Company purchased the farm in 1904 from The Berlin Missionary Society.¹¹⁸ The chairman and a large shareholder was JD Celliers. During the years of 1903 and 1904 the mine featured in the correspondence of H Eckstein & Co a number of times. It would appear that the management of H Eckstein & Co could not make up their minds if they wanted to buy it or not.

At the first AGM of Edendale Estates Ltd, JD Celliers reported that a shaft was sunk to a depth of 45 m and a second shaft had reached 61 m, these were sunk during 1904. At a depth of 30 m (most probably the 1st level) there was development over a length of 180 m. The output was stated to be several hundred tons per month. There was over 11 000 tons of ore ‘in sight’ and it assayed 72 – 80% galena (lead sulphide) and 450 g per ton silver. He went on to explain that all working capital had been exhausted in developing the shafts, various levels and machinery and that a loan of £10 000 was required to continue operations.¹¹⁹ It has to be assumed that the capital was raised, because the company was still operating one year later.

In September 1905, the main theme of the chairman’s report was the lack of working capital, but despite this the company continued with development. Sinking a new main shaft to the third level and driving along the second level for a further 212 m. In the previous twelve months the company had sold 1 120 tons of lead ore. One of the largest, ongoing problems for the various Edendale mining companies was the inflow of water into the mine. Expensive pumping resolved this problem. By selling the water to the

¹¹⁶ Archives of H Eckstein & Co Ltd. Volume HE 234, file 71E Edendale no 4, 30 August 1904.

¹¹⁷ Registrar of Companies, Pretoria, File 01/01998/07, Edendale Estates Ltd.

¹¹⁸ *Ibid.*

¹¹⁹ ‘Edendale Estates’, *The South African Mines, Commerce and Industries*, Vol. 2, (17 December 1904), p. 897.

Premier Diamond mine, the Edendale Company was able to cover the cost of pumping and make a profit.¹²⁰ The water was supplied on a continuous basis and this became a monthly source of income to Edendale Estates, selling on average 18 million litres per month.¹²¹

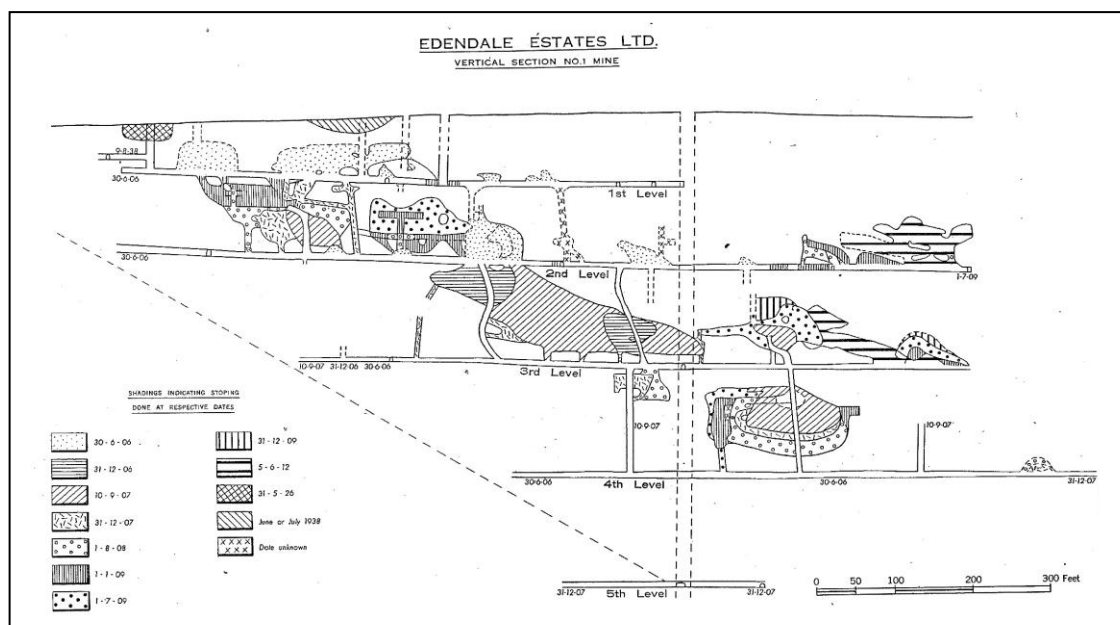


Fig. 12 Number 1 mine Edendale Estates Ltd 1903 –1909 showing underground development.¹²²

In the first half of 1906 there were a number of monthly reports published in *The South African Mines, Commerce and Industries*. From these reports it has become clear that a considerable amount of underground development was achieved in the following six month period.¹²³ By August 1906 the main shaft was sunk a further 94 m, to a final depth of 184 m. At the same time drives were developed east and west of the shaft for several hundred metres. The ore body was developed for mining by the additions of a series of winzes and raises and ore was mined. Several reports comment on the unusual fact that the width of the lode, although generally at 15 cm for most of the deposit, appeared to widen with depth reaching an average of 1.0 to 1.5 m between the third and

¹²⁰ 'Edendale Estates', *The South African Mines, Commerce and Industries*, Vol. 3, (30 September 1905), p. 689.

¹²¹ 'Edendale Estates', *The South African Mines, Commerce and Industries*, Vol. 4, (26 May 1906), p 246. See also *Ibid.*, (30 June 1906), p. 349.

¹²² J Willemse, et al., *Lead Deposits of the Union of South Africa and South West Africa with some notes on associated ores*, plate 16.

¹²³ 'Edendale Estates', *The South African Mines, Commerce and Industries*, Vol. 3, (24 February 1906), p. 1169.

fifth levels. The reports also comment on the ore body carrying lead ore as the primary vein in the form of solid galena (lead sulphide) and that there was a considerable thickness of cerussite (lead carbonate) either side of the galena. From February the manager's monthly reports state that from the third level the value of argentiferous zinc in the ore body increased from 2% to 10% as the mine developed in depth.¹²⁴

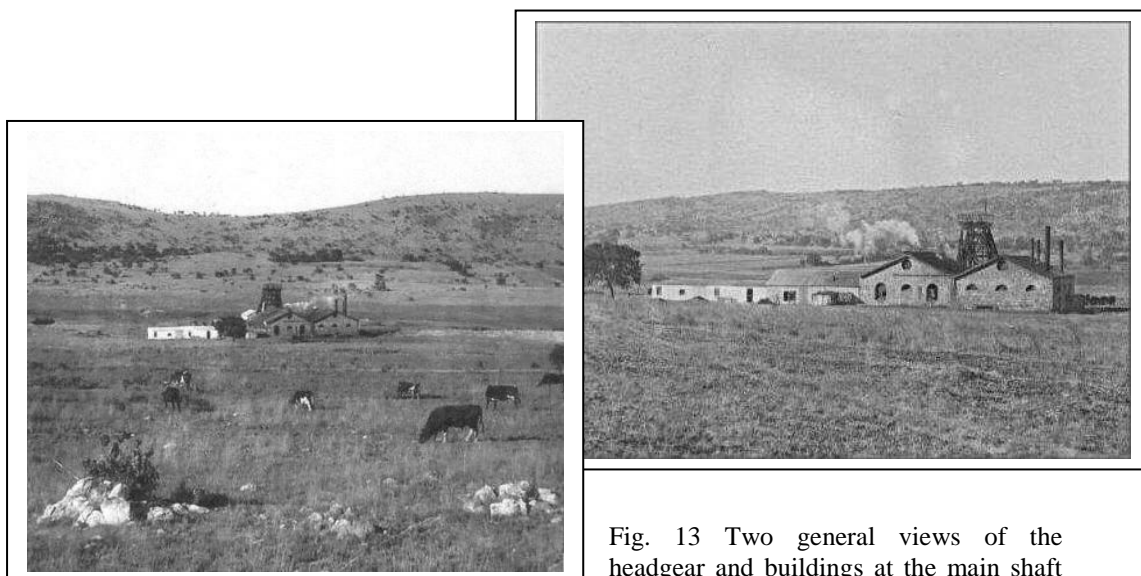


Fig. 13 Two general views of the headgear and buildings at the main shaft of the Number 1 mine Edendale. c1906.¹²⁵

The greater depth also required the installation of new, larger headgear. Between May and July 1906 additional ore treatment equipment was installed in the form of concentrators and a screening plant and this was required not only to handle the additional output of ore, but also the mixture of lead and zinc ore. Fifth level development was commenced with drives on the lode being started in August. In July, mention is made for the first time of shaft sinking operations beginning at the Number 2 mine.¹²⁶

By early 1907 the company was again running into financial difficulties and at a special general meeting of the shareholders it was requested that the company's capital be reduced from £180 000 to £30 000 and thereafter, increasing it to £45 000 by a share

¹²⁴ 'Edendale Estates Ltd - Extracts from the Manager's report for March', The South African Mines, Commerce and Industries, Vol. 4, (21 April 1906), p. 129. See also 'Edendale Estates', The South African Mines, Commerce and Industries, Vol. 4, (26 May 1906), p. 246. See also 'Edendale Estates', The South African Mines, Commerce and Industries, Vol. 4, (30 June 1906), p. 349.

¹²⁵ Edendale Number 1 Mine headgear and engine house c1906. Photographs supplied by Mr Vernon Oliver of the farm Edendale, 2004 in personal communication.

¹²⁶ 'Edendale Estates', The South African Mines, Commerce and Industries, Vol. 4, (21 July 1906), p. 419.

issue. It was stated that the sole purpose of this request was to find more working capital.¹²⁷ It is not clear if the plan to raise more capital was successful, because no sources could be found for the period between August 1907 and July 1908. It would appear that the capital was raised, because mention is made of the commissioning of a large modern ore dressing plant at Edendale Estates Ltd, which was capable of dressing up to 100 tons of ore per day on a 24-hour basis. The plant included twelve sets of newly designed jiggers, a stone-breaker, a set of heavy rolls, screens and sorting tables. According to a press report it was "...the first of its kind in the Transvaal and capable of smelting ore direct from the mine" In his annual report for 1906–7 the mine manager, Mr Roberts, estimated the ore reserves at 37 658 tons.¹²⁸

A report appeared in July 1908 stating that the 'Edendale Lead mine' was to resume operations despite having been placed in liquidation by one its creditors, Sir TK Murray, a few months earlier. The report continues by stating that Sir TK Murray has acquired the property and proposes to re-open the mine.¹²⁹ It would appear that the mine ran into a serious cash flow problem again and operations were shut down sometime in 1909. The records of the Government Mining Engineer show that it closed in December of 1909.¹³⁰

Between the years 1911 and 1912 a new syndicate, the Donerhoeyul Tributing Syndicate Ltd, produced 176 tons of lead, zinc ore, concentrates and 35 kg of silver. It is unclear if they actually mined ore or re-worked the dumps. When Edendale Estates was liquidated in 1909 there were: "Considerable quantities of zinc blende ...but in the absence of a plant to treat it the ore has been dumped for future treatment."¹³¹ In the Inspector of Mines report for 1914, TG Trevor reported that "...the Donerhoeyul

¹²⁷ 'Edendale Estates', The South African Mines, Commerce and Industries, Vol. 4, (5 January 1907), p. 379.

¹²⁸ 'Edendale Lead Mines to Resume Operations', The South African Mining Journal, (4 July 1908), p. 489.

¹²⁹ *Ibid.*

¹³⁰ Council for Geoscience, Pretoria, PH Allport, 'Lead Production of the Union of South Africa', Report no. 1940-0070, p. 12.

¹³¹ 'Edendale Estates', The South African Mining Journal, (5 January 1907), p. 379.

Tributing Syndicate, better known as [the old] Edendale Estates, had closed down during the year.”¹³²

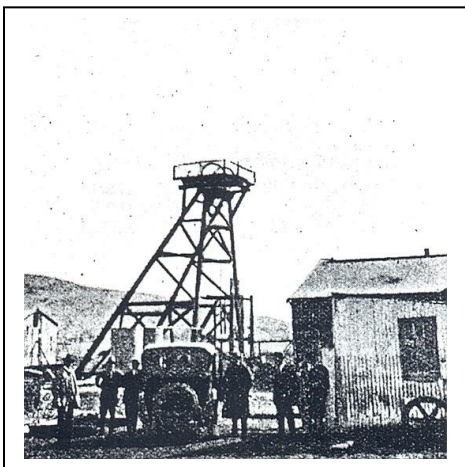


Fig. 14 Main shaft at Edendale No 1 mine.

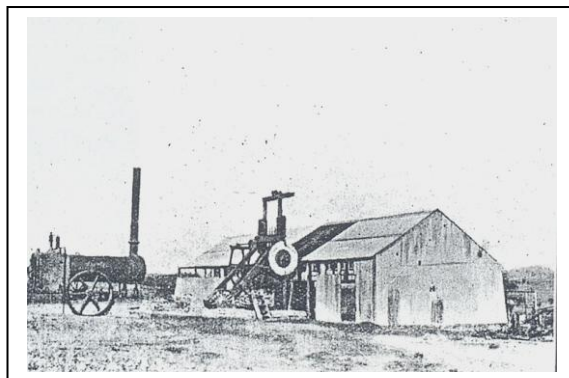
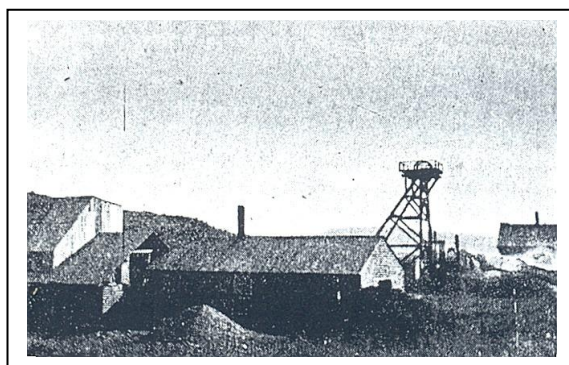


Fig. 15 Stamp battery and engine at Edendale No 1 mine.

Fig. 16 Main shaft headgear and associated buildings at Edendale No 1 mine.



Photographs of the Edendale Mine c1921¹³³

In 1918 –1919 a new company, the Edendale Inspection Syndicate, de-watered the mine and carried out a sampling programme. No further information could be found on this syndicate, but it seems that it may have been linked to the next stage in the history of the mine when a new company flotation was offered in 1920.¹³⁴ The mine manager, H Hicks, wrote two reports referred to in the prospectus for the Edendale Development Syndicate Ltd.¹³⁵ In his first report (made at the inception of the company - April 1920) he draws attention to the fact that the ground between the two mines had not been exploited and that he expected good tonnages of ore to be found in the undeveloped area. He also states that the machinery (presumably of the old Edendale Estates Co or

¹³² ‘Mining Progress in the Outside Districts’, *The South African Mining Journal*, (3 October 1914), p. 69.

¹³³ ‘Improved outlook for the Edendale’, *The SA Mining and Engineering Journal*, (21 May 1921), p. 1143.

¹³⁴ Council for Geoscience, Pretoria, PH Allport, ‘Lead Production of the Union of South Africa’, Report no. 1940-0070, 1940, p. 13.

¹³⁵ Registrar of Companies, Pretoria, File 01/06477/10, Edendale Developing Syndicate Ltd.

the Donerhoeycul Tributing Syndicate) was fit for the initial purpose of the new company, certainly until the new company would be in a sound financial state to purchase new machinery.¹³⁶ From a comment he made in his second report it is clear he had previously worked on Edendale for a number of years, and in a later journal report it is mentioned that he had been the mine manager in 1903.¹³⁷

In August 1920 Hicks stated in his second report that they had erected a 5-stamp battery and associated machinery and that concentrating equipment such as Wilfley tables had also been installed. During underground development they had found a new lode. The average width of the lode was 1.5 m of which 60 cm was 'first class ore' assaying at 80% lead and 202 g per ton silver. His report continued in a very strong manner stating that the remaining 91 cm of the lode assayed at an average of 20% lead and should yield 1 ton of concentrates for every 4 tons of crushed ore. With many years experience on the mine, he said he was looking forward to shipping approximately 100 tons of concentrates per month.¹³⁸

By the end of 1920 there was great excitement in the market as the forthcoming flotation of a full mining company was announced. In May 1921 the mine was considered a very promising venture. A third shaft had been sunk to a depth of 17 m and connected up to the no 2 shaft with a drive. The drive was continued eastwards for 36 m under the cerussite [lead carbonate]. The width of the vein averaged 46 cm of cerussite and first class galena [lead sulphide]. Another prospecting shaft was sunk 54 m west of the no 3 prospecting shaft. At a depth of 10 m the lode was intersected and had a width of 101 cm. The total length of vein exposed by 1921 was 213 m.¹³⁹

Although there seemed to be a good deal of excitement about the mine and its management in 1920 and 1921, the results in terms of tonnages produced do not make for encouraging reading. It is not known if the Edendale mine was affected by the 1922

¹³⁶ 'Advertisement for the Edendale Developing Syndicate, Ltd', *The SA Mining and Engineering Journal*, (28 August 1920), p. 677.

¹³⁷ 'Improved Outlook for the Edendale', *The SA Mining and Engineering Journal*, (21 May 1921), p. 1143.

¹³⁸ 'Advertisement for the Edendale Developing Syndicate, Ltd', *The SA Mining and Engineering Journal*, (28 August 1920), p. 677.

¹³⁹ 'Improved Outlook for the Edendale.' *The SA Mining and Engineering Journal*, (21 May 1921), p. 1143.

strike. It is possible that by 1922 the mine had already gone into decline prior to its closure in 1923. By early 1923 the Edendale Development Syndicate Ltd was also liquidated and was replaced by Edendale Lead Mines Ltd, which operated from 1928 to 1931, but only conducted some development work. In comparison to the 1904–1909 period when the average annual production was 900 tons per year, the 1921–1927 period had a high of only 83 tons, and averages of 40 tons per year. In 1930 and 1931 a further 37 m of shaft sinking was carried out. In 1932 and 1933 the mine is again recorded under the control of H Hicks, however, it appears that he only carried out prospecting operations. In 1935 The Edendale Lead and Zinc Mining Co conducted shaft sinking and developing, but no details are known.¹⁴⁰

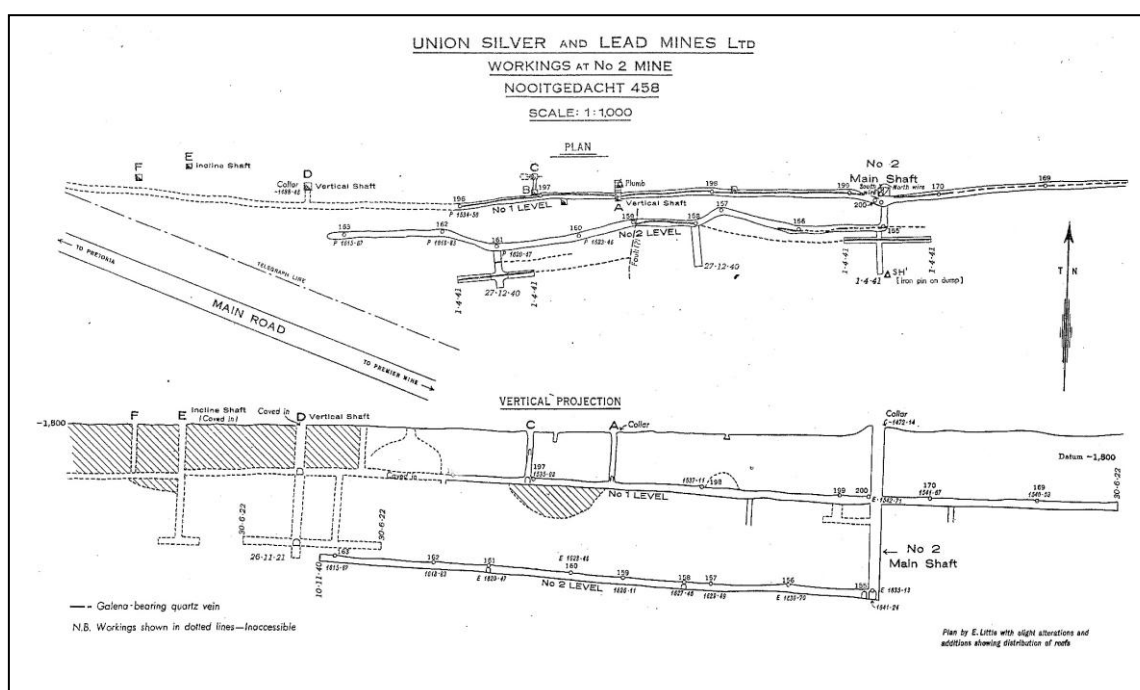


Fig. 17 Union Silver and Lead Mines Ltd - underground development of the Number 2 mine, c1940.¹⁴¹

By 1937 they were replaced by yet another company, the Union Lead Mine Ltd, under the control of JV Bester. The company produced 65 tons of lead ore: however, this company only lasted a year and was taken over by Union Silver and Lead Mines Ltd¹⁴² which in 1938 produced 88 tons of lead ore and concentrates. It appears that they may

¹⁴⁰ Council for Geoscience, Pretoria, PH Allport, 'Lead Production of the Union of South Africa', Report no 1940-0070, 1940, pp. 13-14.

¹⁴¹ J Willemse, et al., *Lead Deposits of the Union of South Africa and South West Africa with some notes on associated ores*, plate 17.

¹⁴² Registrar of Companies, Pretoria. File 05/10044/06, Union Lead and Silver Mine Ltd.

have had a sintering/smelting process in the 1930s, although from the description of it, it was rudimentary and probably not very efficient. The sources state that smelting was not a success and that the reverberatory furnace was converted to a sintering process with an output of 2.5 tons per day.¹⁴³ The company continued developing until 1941, after which there are no further records of activity on the mine.¹⁴⁴

During the various periods of operation discussed above, virtually no records of shareholder meetings have been found and this has led to the history being based primarily on newspaper and journal reports of mining activities. The period from 1921 to 1937 is devoid of journal reporting on the mine, and the only source for activities and tonnages, as well as the names of companies, is the 1940 report by Allport.¹⁴⁵ This was a period of high speculation on the Edendale mines with companies being formed and operating, probably on very low working capital and struggling with the high inflows of water. Pumping costs would have crippled most small operators and this is the likely reason for the rise and collapse of so many companies in this period. Lead prices plummeted from 1925 and then on reaching a low point in 1932 began rising through the 1930s. Silver also dipped to a low point in 1932, but after a quick rise in 1933–34, was very flat for the next ten years (see Graph 1, page 22). The result of this downturn in the late 1920s to mid 1930s contributed to the succession of speculative mining companies which failed.

The period of 1949–1974, when the Registrar of Companies has a company listed as the Edendale Lead Mines (Pty) Ltd, is a mystery. No details of any activity at either the No 1 or No 2 mines have been discovered for this time period in any sources. From information in the Registrar of Companies files, the company was always being fined for late submission of company returns. By the 1970s the two remaining directors had ceased to carry on the business [no details given], the company had no assets, and was

¹⁴³ J Willemse, et al., *Lead Deposits of the Union of South Africa and South West Africa with some notes on associated ores*, p 98. See also Council for Geoscience, Pretoria, W Kupferburger, 'Edendale Lead Mine, Union Silver and Lead Mine, Ltd', Report no 1940-0089, 1940 and HD Russell 'Lead Occurrence at Edendale, Nooitgedacht 458 (173) Pretoria District', Report No 1940-0077, 1940.

¹⁴⁴ *Ibid.*

¹⁴⁵ Council for Geoscience, Pretoria, PH Allport, 'Lead Production of the Union of South Africa', Report no 1940-0070, 1940, p. 12.

insolvent and in 1974 the company was struck off the Register of Companies.¹⁴⁶ The inclusion of the details for this period completes the history of this substantial mine, which is known to have had nine changes of ownership over an interrupted productive life of at least fifty years (1890–1941) and possibly some form of production into the 1960s giving it a potential life span of seventy years, during which it has been conservatively estimated to have produced 5000 tons of lead and just over 1100 kg of silver.

In 2010, the Number 1 mine area was very overgrown - some of the reduction works foundations, including the furnace foundations, were found. Although most of the waste dumps have been removed, probably for road construction material, there are still small dumps of the slag and sintered ore. The main shaft is flooded to about six metres below ground level. The area of the Number 2 mine is very unstable and dangerous, with significant collapses of the shaft area and the trenches leading to the upper stope levels. This mine is also flooded close to ground level. A recent Master's dissertation by J Glass presents details of possible pollution from the remains of the Edendale lead mining activities, although the details presented of the mine workings and her conclusions have a number of inaccuracies.¹⁴⁷

The three mines discussed in this chapter all have one common link - the H Eckstein & Co. Although the company did not ultimately invest in either the Albert or Edendale mines they were approached in the hope that they would invest. They had their consulting engineers look at the possibilities of profitability of the two mines, but in both cases were advised to stay out of them. The main reason for not taking control of them appears to have been doubt regarding the yield of silver. With hindsight they made the right decisions, although the problem with the Edendale mine was not so much the profitability of the deposit, but the need for huge amounts of capital to deal with the excessive inflows of water and the resulting high pumping costs. Ultimately, the mines of Edendale (the No 1 and No 2 mine) can be considered as substantial operations for the time period in which they were developed.

¹⁴⁶ Registrar of Companies, Pretoria. File 05/32966/07, Edendale Lead Mines (Pty) Ltd.

¹⁴⁷ J Glass, 'The Environmental Impact of the Abandoned Edendale Lead Mine near Tshwane, South Africa.' Unpublished MSc dissertation, University of Johannesburg.

The deposit at Albert, although apparently rich in silver, was a much smaller ore-body. The complex metallurgy of the deposit with its mixture of metallic elements was far in excess of the capabilities of smelters of the 1890s to resolve. The significant problem at the Albert mine was management incompetence. They began by placing the main shaft in the wrong place relative to the ore body and compounded the error by spending the working capital on development without the benefit of mining and selling concentrates.

All three of the mines discussed in this chapter produced many tons of silver. The Willows mine was not only very rich as an ore-body, but unlike the Edendale and Albert mines, had huge advances of capital investment and working capital. As a producer of silver in the 1890s it was the largest in the greater Pretoria region with an output calculated at 19 tons of silver (see Appendix 3). OJ Skill as the mine manager lacked the competence and responsibility needed for the position. It has been shown that he was working more for himself than the mining company and that development and smelting operations were far from competently managed and resulted in the eventual financial failure of the mine. The history of silver mining in the greater Pretoria region continues with the silver producing mines at Argent.

Although a number of Randlords were active in the Albert and Willows mines management, they were also the principle driving force in the financial development of these two mines, as initial investors and in investing further capital into the companies. The Edendale mine, as one of the major silver and lead mines, is unique in that throughout its life it never fell under the 'Randlord' umbrella. The H Eckstein & Co investigated the mine in the early 1890s as a potential investment opportunity, but declined involvement in it for reasons which were explained. The development of the Edendale mine was left to lesser speculators and although the mine had a long and productive life, it did see an extraordinary number of companies form and eventually fail with the mine. Ironically the fluctuating international price of metals – lead and silver – seems to have had less impact on the Edendale mine than other silver mines in the region.

Chapter 3

THE ARGENT SILVER MINES, 1889–1899

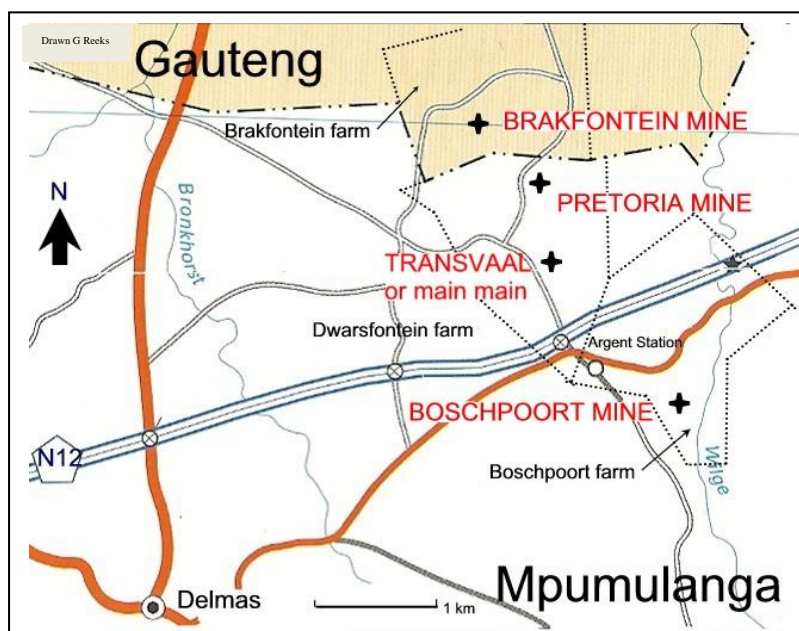
The Pretoria far southeast or Argent area, with its formerly silver rich mines, is located close to the railway siding of Argent, 40 km east of the town of Springs. For simplicity the name ‘Argent mines’, often used in this dissertation, refers to the four mines located on the farms Brakfontein, Boschpoort and Dwarsfontein that are discussed in this chapter and in chapter 4. This area was always the main centre of silver mining in the country, with the Transvaal mine on the farm Dwarsfontein being the largest, deepest, and longest running mine - albeit intermittently - for silver in the greater Pretoria region. The term ‘Transvaal mine’ is used as a generic term to describe the same mine under its different operating names, as it has changed name and ownership a number of times over the one hundred years of its history. It was known as the Transvaal Silver Mines Ltd in the 1890s. It became Transvaal Silver and Base Metals Ltd, during the 1920s, then Dwarsfontein Galena Ltd in the early 1940s and finally in the 1950s and 1970s as the Argent Lead and Zinc Ltd. The three name changes coincide with the periods during which major mining occurred, and the fourth period of the 1970s, when only investigations into the potential of the area, and its mines were carried out.

The first period - discussed in this chapter - was in the 1880s and 1890s under the ultimate control of H Eckstein & Co. The period from 1900 to 1999 will be discussed in chapter 4. Although in effect chapter 4 covers a longer period of time, nearly hundred years, there were lengthy periods of inactivity on the four mines that make up the Argent mines. In general there was far less political intrigue connected with the mines in the twentieth century and interest in the mines was purely economic, initially with small operators to 1919 and then between the various mining houses up to the 1970s.

Initially the Transvaal mine on Dwarsfontein was owned by various diamond and gold Randlords - specifically Barney Barnato and his nephew Wolf Joel. Because of the richness of the deposit of the Transvaal mine, intrigue and in-fighting followed when other Randlords - such as Hermann Eckstein, Lionel Phillips and Alfred Beit - became interested in the deposit. Other notables like Carl Hannau, George Kynoch and George

Farrar where involved in other silver mines in this area. By 1891 the silver mining industry in the region had become polarised between two primary players - H Eckstein & Co and the Witpoortje Syndicate, controlled by George Farrar. Eventually the partners of the two companies merged their silver mining interests under the control of H Eckstein & Co to become the dominant force in the silver mining industry before 1900. The period would see political intrigue, both within the boardroom and on a national political level. The deteriorating relationship between Kruger and the Randlords discussed in chapter 1 was to have an impact on the Transvaal Silver Mines Ltd, although the most devastating impact was the collapse in the price of silver and lead in 1894.

This chapter deals with the period of mining activity from 1889 until the outbreak of the Anglo-Boer War in 1899. The Witpoortje syndicate had its two most important properties in the Argent mines area – the Brakfontein and Boschpoort deposits. These deposits were on farms of the same names and shared common boundaries with the farm Dwarsfontein, on which the deposits of the Transvaal mine (main mine) and the Pretoria Silver Lead Mine (Pretoria mine) were located.¹ These four mines formed the ‘Argent mines’.



Map 2. The location of the Argent mines and farms.

Note the term main mine is synonymous with Transvaal mine

¹ Because there are the remains of two mines on the farm Dwarsfontein and they were operated as separate companies, the narrative will refer to them as the Transvaal mine which is synonymous with the ‘main mine’ or ‘Argent main mine’ and operated as the Transvaal Silver Mines Ltd in the 1890s. The other mining company developed the Shimwell vein and will be referred to as the Pretoria Silver and Lead Mine Ltd, or Pretoria mine, which features more in chapter 4 than this chapter.

Geographically the mines are located north and south of the Johannesburg - Witbank N12 highway, close to a rail siding at a station named Argent, east of Delmas.

One of the earliest references for the district involves the finding of a lead chromate in 1885 and thus the possibility of silver rich ores on the farm Dwarsfontein.² The results of the analysis, it must be assumed, led to the prospecting of the area and the finding of significantly silver rich lead deposits. Although, no records have been found of such prospecting activity, it is known to have occurred because of the extensive prospecting trenches on the Transvaal mine property. A company, the Transvaal Silver Mines Ltd, was formed to prospect and mine the deposit on 23 January 1889, with a capital of £270 000, of which £25 000 was reserved for working capital. The first Board of directors included Barney Barnato (chairman), diamond magnate and chairman of Johannesburg Consolidated Investment Company (JCI). George Farrar (chairman of the Witpoortje Syndicate), W Ross, HC Trull, Samuel W Jameson (a director of the Willows (Silver) Mine Ltd), George A Tilney (a mining speculator and a director of Crown Reef Gold mine) and George Kynoch (a director of the Nevada Silver and Smelting Company).³ In the following year additional directors, supportive of the Barnatos, were appointed to the Board.

A report in *The Diggers' News* for June 2, 1889 stated that: "A new lode has been struck ...and sinking upon it is now being proceeded with...ore from the main lode gave an average yield of 76 ozs of silver per ton."⁴ Another report in the same newspaper, but dated June 11, 1889, states "...seven small incline shafts are down to various depths of 30 to 43 feet...A powerful hauling and pumping plant from the Sandycroft Foundry Company has already been delivered at the mine [for installation] at the main shaft."⁵ Clearly the richness of the deposit was sufficient to attract large amounts of investment

² Letter from E Dawson, Chemical & Metallurgical Laboratory, Pretoria, ZAR. To the Mineralogical Society, London, 'Lead chromate from near Pretoria', 27 July 1885, *Mineralogical Magazine*, Vol. 6, 1886, pp. xviii-xix. Samples of the mineral were sent for analysis in London and the results showed that it was the very rare mineral species crocoite (PbCrO₄). The only places that crocoite has been found in South Africa are at the main mine and the Shimwell vein (Pretoria mine), both on the farm Dwarsfontein.

³ Registrar of Companies, Pretoria. File 01/00219/06, Transvaal Silver Mines Ltd, Registered 31 January 1891.

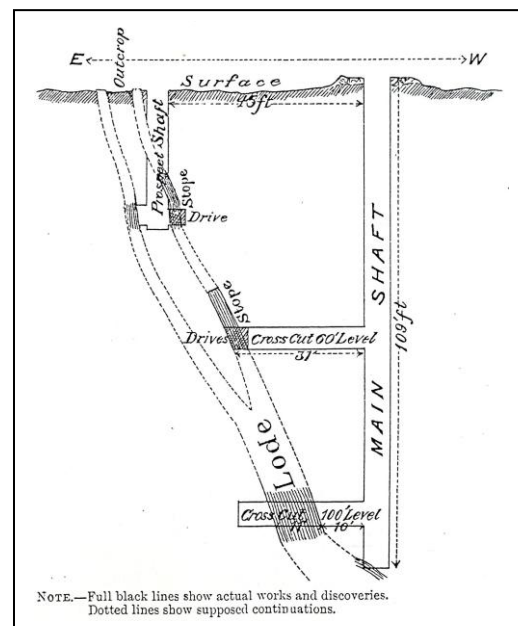
⁴ 'Transvaal Silver Mines', *The Diggers' News*, 2 June 1889.

⁵ 'Transvaal Silver Mines (Limited)', *The Diggers' News*, 11 June 1889.

capital into the company and it was soon listed on the Johannesburg Stock Exchange. In July 1889 an inflow of water was encountered in the deeper parts of the mine.⁶ By the end of August 1899, the pumping and hauling plant had been commissioned and shaft sinking continued down to 17 m with the water problem under control. A new prospect shaft was begun on the main lode and reached a depth of 7 m. The development of a drive showed that the lode ranged from 1.3 m to 1.5 m wide.⁷

Fig.18 Cross-section through the main and prospect shafts of the Transvaal Silver Mine, circa 1889.

8



The finding of the originals of the mine engineer's reports in the Harold Strange Library, the reports and proceedings of the 2nd to the 6th Annual General Meetings of shareholders of the Transvaal Silver Mines Ltd and the mine plans of the Transvaal mine for 1890 and 1892 in the Barlow Rand Archives, provided significant and unprecedented details on the actual layout of most of the mine surface structures for the 1890s. The plans do not show the concentration plant building or the smelting plant, both of which are discussed in more detail below. The report by the consulting mining engineer, WH Furlonge, describes the two lodes on the property as the west lode and the east lode, approximately 2 km apart.

⁶ 'Transvaal Silver Mines', *The Diggers' News*, 9 July 1889.

⁷ 'Silver Mines', *The Diggers' News*, 22 August 1890. [see fig. 18 above which shows both shafts]

⁸ Transvaal Silver Mines – Report to Directors of Transvaal Silver Mines Ltd by H Jennings, (April 1890), Harold Strange Library, Johannesburg Public Library, Johannesburg.

Approximately 18 m south of the prospecting shaft, the new main shaft had by December 1889 reached a depth of 40 m (130 ft level).⁹ On 7 December 1889, *The Diggers' News* reported:

”...a 3ft seam of galena [had] been struck in a drive from the main shaft at a depth of 100 ft. It gives 50% lead, and 75 ozs of silver to the ton. 25 tons of it are being packed in skins and shipped to Barnato Bros in London.”¹⁰

It is clear from this newspaper report that the deposit was very rich and that the Barnato family were intent on controlling the whole process of mining and selling the ore. The first Annual General Meeting (AGM) of shareholders was held on 31 January 1890. A press report of the meeting infers a share fraud by Barnato, which became the lever for Eckstein, Phillips and Beit, as directors of H Eckstein & Co, to remove the Barnato faction as directors of the Transvaal Silver Mine Ltd. In the press report a Mr Lithauer - a shareholder - objected to money of the company being invested in shares of JCI, owned by the Barnatos. Initially the transaction had made a profit, but by the time of the AGM the value of the shares had dropped, thus reflecting a loss to Transvaal Silver Mines Ltd. Lithauer's argument was that such funds should be used to develop the Transvaal mine and not venture into speculation capital.¹¹ At the time of the Barnato control of the company, not all shareholders were happy with the purchase of the shares, although they ratified the purchase. Because Barnato had voted for the transaction and he was the interested seller of the shares, his action in voting had made the transaction illegal.

The Barnatos controlled the original board of directors, but early in 1890 Beit, Eckstein and Phillips - who were already involved with the Willows mine near Pretoria - decided that it was time to make a hostile takeover of the Transvaal Silver Mines Ltd in order to remove the Barnatos from control of the company. From the early days of Kimberly and its diamond mining industry the people connected with Rhodes and Beit - including Phillips and Eckstein - were vehemently opposed to anything involving the Barnatos.¹²

⁹ Transvaal Silver Mines - Report to Directors of Transvaal Silver Mines by WH Furlonge, (26 November 1889). Harold Strange Library, Johannesburg Public Library, Johannesburg.

¹⁰ 'Transvaal Silver Mines', *The Diggers' News*, 7 December 1889.

¹¹ 'Transvaal Silver Mines Ltd', *The Diggers' News*, 1 February 1890.

¹² It must be clarified that Rhodes was never involved with the silver mining industry.

The animosity came from the early days of their diamond mining days at Kimberly when the Barnato's mining company was in competition with Rhodes and his company. Phillips and Eckstein had both been managers of diamond mining companies in the Kimberly area and as such they were both known to and became close confidants of Alfred Beit, the financial power behind Rhodes and later Eckstein's company H Eckstein & Co Ltd.¹³

The hostile takeover was accomplished by buying up blocks of shares until they had enough to demand directorships at the next AGM. Then from within the company, Beit and colleagues staged an effective coup d'état by ousting directors who were aligned with Barnato. This was achieved by altering the trust deed at an Extraordinary General Meeting held in November 1889. The new trust deed required directors to personally hold at least 1 000 shares in the company and in the following extract of Phillips' letter to Beit dated 18 April 1890, note how he outlines the plan and the economic plotting that was going on by the directors of H Eckstein & Co to achieve their objective of ousting Barnato:

We have bought and have control so far of about 30,000 shares at 6/-. I sent for a copy of the Trust Deed. The Barnato people were all powerful formerly in this concern but we hear on good authority have but a few shares left. De Pass and Finlayson hold about 60,000 shares between them but we are told are at daggers drawn. Altogether we require half their shares or a few more actually to control the concern. You will see that it is a "wide" Trust Deed and the directors have full powers. The writer will go on the Board as alternate for Trull. The present Board consists of Trull, Ross (of the May Co. not the ... [faded]) G. de Pass, Lowenthal, Rynoth, Farrar, Jameson, Barnato, Joel, McDonald, and I de Pass. Some of these have alternates. McDonald is Barnato's secretary but is to be removed from the Board next meeting because he was not qualified at time of election and one of our men just in his place. Lowenthal is working with Trull as well as de Pass. Hence we have the majority of the Board here...Kynoch is likely to sell out and we must get a man who will work with us in his place.¹⁴

By May 1890 the H Eckstein & Co owned 64 000 shares in Transvaal Silver Mines Ltd and thus a controlling interest.¹⁵ The planned financial reorganisation was carried out when the capital was reduced to £54 000, being one share for five. It was increased

¹³ M Meredith, *Diamonds, Gold and War – The Making of South Africa*, p. 187 & p. 193.

¹⁴ Archives of H Eckstein & Co Ltd. Volume HE 149, pp. 186-187, 18 April 1890.

¹⁵ *Ibid.*, p. 199, 2 May 1890.

again in August 1890 by 54 000 shares at par, with a further 12 000 shares held in reserve, bringing the total value to £120 000.¹⁶

A comprehensive report on the mine was written in early 1890 by Hennen Jennings. . Jennings detailed the development of the surface winzes and the main shaft and was critical of the previous development in terms of the pumping equipment installed. He argued that it was inadequate, but in one instance was oversized for the needs at that stage. Jennings also made a number of recommendations for the future development of the mine, in particular the development of drives from the main shafts on the east and west lodes and the smelting of the ore at the mine. The report contains a detailed list of the machinery and buildings, as well as the number of employees, which at that stage he listed as 14 whites and 50 blacks.¹⁷ Although the report lists two Blake jaw crushers in the machinery, there is no indication of a concentration plant at the mine at this time. It has not been possible to determine when the concentration plant was constructed, as it does not appear on either the 1890 or 1892 plans. It seems likely that the Blake crushers were installed in the early part of 1890 or even in 1889 and one has to assume in the positions shown in the photographs below.



Fig 19 Blake jaw crusher foundation in 2008.¹⁸



Fig 20 Blake jaw crushers & foundations in 1902 (they are just above the large pipes) with the 1890s concentration plant building behind.¹⁹

¹⁶ Archives of H Eckstein & Co Ltd. Volume HE 149, p. 199, 2 May 1890.

¹⁷ Transvaal Silver Mines - Report to Directors of Transvaal Silver Mines by H Jennings, (April 1890), Harold Strange Library, Johannesburg Public Library, Johannesburg.

¹⁸ Author's photograph.

¹⁹ National Archives of South Africa, Pretoria. Depot TAB, Source CJC, Volume No. 43, Ref. CJC796 – Claims for Compensation British Subject Transvaal. Pretoria. Transvaal Silver Mines Limited.

These crushers required substantial foundations, such as the ones of dressed stone in the photograph (Fig 19). The concentration plant building was most probably constructed in the latter part of 1891 to coincide with the installation of the smelting plant. During the archaeological excavations the position of the foundations of the concentration building relative to the Blake crushers appears to confirm this hypothesis, as does the only record of the building - the photograph of it (Fig 20) - which is discussed in the next chapter. On 10 April 1890 the mine was temporarily closed down for some unknown reason and the mine was allowed to flood. One can only assume that during the change of ownership no mining operations took place, but by July 1890 the mine was being de-watered and then it re-opened.²⁰

In July 1890, Phillips was appointed chairman of the Transvaal Silver Mines Ltd. with Hermann Eckstein's brother Friedrich as a director and so the boardroom coup d'état was completed, and Phillips wrote to Beit in London giving details of the directors:

Transvaal Silver: You will be glad to hear that the registration of the supplementary Articles of Association and decrease of capital disqualifies the following: Barnato, Joel, EC Jameson, G de Pass, I de Pass, G Raws. The writer has been elected chairman, and Mr F Eckstein a director...my only desire is to have enough safe men on to have absolute command of the seat at the board. Barnato's representative (Lance) was thunderstruck when he was informed of his chief's disqualification as well as that of Joel.²¹

The letter continued by giving details of the additional agenda, namely to re-elect G de Pass, I de Pass and G Raws to the London Board. It has not become clear why these three men were so favoured, unless it was an attempt to wean them away from the Barnato camp. It is known that I de Pass was already working for Beit in London. A further example of expedient boardroom politics was an agreement between Phillips and Farrar to re-elect G Raws as a director. Raws was closely associated with George Farrar and two other directors, Ross and Trull in the Witpoortje Syndicate. As Phillips was probably looking towards a merger with the Witpoortje Syndicate it made sense to keep them on the Board of Transvaal Silver Mines Ltd.

²⁰ Archives of H Eckstein & Co Ltd, Volume HE 5 Annexure 17. Transvaal Silver Mines – Consulting Engineers' Report to Directors of Transvaal Silver Mines by H Jennings, February 1891.

²¹ Archives of H Eckstein & Co Ltd. Volume HE 149, p. 288. 18 July 1890.

Soon after the takeover Phillips states in a letter to Beit: “I have settled the dispute with Barnato Brothers,” and continues by giving further details of Barnato’s fraud. The letter indicates how the H Eckstein & Co applied pressure on Barnato in order to gain control of the Transvaal Silver Mines company. The directors of H Eckstein & Co knew that their own actions and the legality of the methods used in the ousting of the Barnato faction from the Board may have been questionable. Phillips doubted if they could have proved the fraud, so it was a form of economic and social blackmail that gained them control of Transvaal Silver Mines Ltd.²² The irony of the re-formation of the board is that it went from being a Barnato supportive one, to an Eckstein/Phillips supportive one.

In April 1890, when Phillips had taken over as chairman, he was informed that a lease had been taken out by Samuel Fox²³ on the adjoining farmer’s portion of the farm Dwarsfontein.²⁴ This portion of the farm covered the supposed area where the vein might extend to laterally, in a so called ‘deep level’ development at a depth of approximately 300 m. The company took Fox to court over the matter, citing that the farmer was obliged to offer the portion to the company first in terms of their lease agreement.²⁵ This was a test case regarding the pegging of claims on property next to an optioned farm on which there was a working/established mine. In taking out a mining lease, a company defines an area of operation regardless of depth below surface. If the mineralised lode or vein is dipping in a particular direction it is possible that the vein may extend outside of the lease area at depth. This became evident with the gold reefs of the Rand and led to the formation of the ‘Deep Levels’ companies such as Crown Deep in Johannesburg. In theory if you had the leased area next to the original company and the vein crossed the boundary, at depth, and into your area, the vein was yours to mine.

In practice, when companies calculated that their vein was going to go out of their lease area, they generally covered themselves by leasing the adjoining portion of a farm. Fox

²² Archives of H Eckstein & Co Ltd. Volume HE 149, p. 604, 9 March 1891.

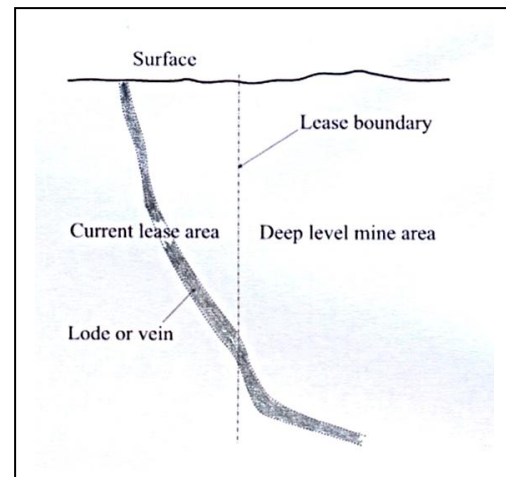
²³ See Appendix 2 for biographical details on Samuel Fox.

²⁴ Many very large farms in the 1890s, as now, were not owned or farmed by one person. Dwarsfontein was subdivided into at least five sub-portions and so a mining company would have to get lease options from each of the farmers/owners.

²⁵ Archives of H Eckstein & Co Ltd. Volume HE 149, p. 199, 2 May 1890.

argued that he had leased the “surface” land from the farmer, but in reality what he had leased was the portion of the farm that was above any deep level section of the vein. They argued successfully that Fox was not a farmer and that in time he would offer the portion of land to them expecting Transvaal Silver Mines Ltd to pay a high value for the lease.

Fig. 21 Sketch of vein crossing a lease boundary so forming a potential deep level lease.



It appeared that Fox was associated with a known speculator - Campbell Johnston - who had intended to lease the ground next to the Transvaal Silver Mines Ltd lease area in what could only have been a speculation attempt.²⁶ During the final stages of the case the Fox party tried to bribe one of the company’s witnesses not to enter the box, and this was brought to the attention of the court.²⁷ The case dragged on for months, but eventually the court declared the contract between Fox and the landowners null and void. Transvaal Silver Mines Ltd gained the rights to the area and concluded an additional lease from the farmer on the ‘deep levels’ portion of the farm. The court case and result had a significant impact on the development of both the Transvaal mine as well as many of the gold mines in Johannesburg, as it clearly defined who had first option to develop the property adjoining an existing mine. Phillips was convinced that Loewenthal, the former managing director under the chairmanship of Barney Barnato was deeply involved with the ‘Deep Levels’ case and consequently Phillips was instrumental in forcing Loewenthal to resign from the board and take retirement.²⁸

²⁶ ‘Transvaal Silver Mines vs. Le Grange, Jacobs and Fox’, *The Standard and Diggers’ News*, 10 May 1891.

²⁷ National Archives of South Africa. Depot TAB. Source ZTPD. Volume 8/267, Ref 4491/1891, Opposed application - Le Grange, Jacobs and S Fox vs. Transvaal Silver Mines. 1891.

²⁸ Archives of H Eckstein & Co Ltd. Volume HE 149, p. 434. 14 November 1890.

Hennen Jennings was appointed as consulting engineer to the Transvaal mine in July 1890.²⁹ He was responsible for de-watering and re-opening the mine after its unexplained closure during the change of ownership.³⁰ A level was started at the 40 m level and a cistern level, for the collection of water prior to pumping to the surface, was cut just below it. The main shaft, by the end of December 1890, had been sunk to a depth of 51 m. The prospect shaft was sunk to the 31 m level and a cross cut driven to the main shaft, during the course of which the lode was proved to have two branches carrying good ore (see fig 18). Jennings, mentions in his report that numerous problems associated with the installation of the new equipment had been encountered and that it was decided to further equip the mine with a machine shop, carpenter's shop and a blacksmith's shop. He stated that all the new additions were to be operational by March 1891.³¹

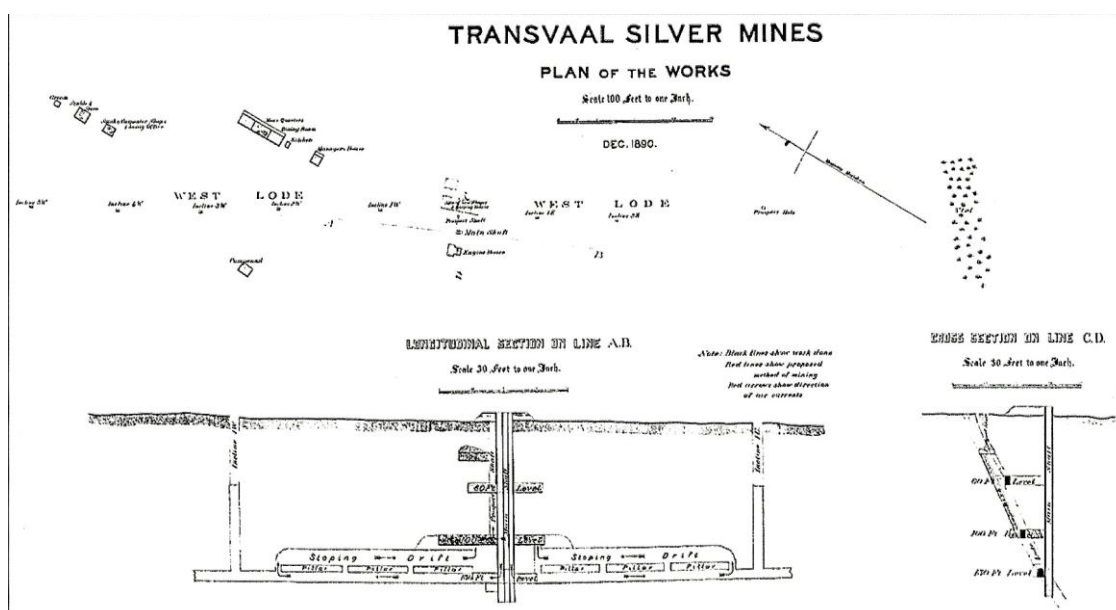


Fig. 22 Transvaal Silver Mines Ltd. 1890 mine plan – underground and surface structures.³² Note some of the details on Plans 1 and 2 may be poor, due to the reduction from an A1 size original. The plan is reproduced as Appendix 5 in a larger scale.

²⁹ Archives of H Eckstein & Co Ltd, Volume HE 5 Annexure 17. Transvaal Silver Mines – Consulting Engineers' Report to Directors of Transvaal Silver Mines Ltd by H Jennings, February 1891.

³⁰ *Ibid.*

³¹ Archives of H Eckstein & Co Ltd, Volume HE 5 Annexure 17. Transvaal Silver Mines – Consulting Engineers' Report to Directors of Transvaal Silver Mines Ltd by H Jennings, February 1891.

³² Archives of H Eckstein & Co Ltd, Volume HE 5, Annexure 19. Plan of underground and surface of Transvaal Silver Mines Ltd. in Report to 2nd AGM of shareholders, 9 April 1891.

During the latter half of 1890, Otto Hahn was appointed as metallurgist and general manager of the mine. Apparently he was an ‘expert’ in the smelting of lead ores, gained from twenty years experience on a number of mines in the USA and Mexico.³³ By the end of 1890, 124 tons of ore had been shipped to England for sale,³⁴ and development of the mine had progressed very well. In February 1891 Phillips wrote that development of the drives on the 40 m level had begun. He commented on how ‘splendid’ the ore body looked at this level, that the surface winzes [from the prospecting trenches] were down to about 15 m and were being developed over a distance of 300 m on the surface of the mine. Samples of the ore were assayed and showed a value of 900 g per ton.³⁵

Hahn completed his drawings for two reverberatory furnaces and George Farrar took them to England for manufacture during the middle of 1891. Towards the end of the year it was reported that the lode had been struck after driving 17 m on the cross cut at the 71 m level and that a consignment of ore at 75% lead and 2.83 kg per ton silver had been shipped to England. The improvement in the operation of the mine is borne out by a press report which stated that the share price of the company had risen from 49 shillings to 60 shillings.³⁶

Two new water-jacketed blast furnaces were landed at Durban in November and were transported to the mine.³⁷ The new furnaces were each capable of smelting 40 tons of ore daily. The smelting plant consisted of the two blast furnaces, two reverberatory roasting furnaces, an elevator to raise the ore to the furnace floors, and a sampling plant with Cornish rolls,³⁸ rock breaker,³⁹ and a 30 m high smoke stack.⁴⁰

³³ Archives of H Eckstein & Co Ltd. Volume HE 5, Annexure 18. Report to 2nd AGM of shareholders, 9 April 1891.

³⁴ Archives of H Eckstein & Co Ltd. Volume HE 149, p. 486, 13 December 1890.

³⁵ *Ibid.*, p. 595, 28 February 1891.

³⁶ ‘The Share Market’, *The South African Mining Journal*, Vol.1, (19 September 1891), p. 15.

³⁷ ‘Transvaal Silver Mines’, *The South African Mining Journal*, Vol. 1, (21 November 1891), p. 128.

³⁸ Cornish Rolls are used to grind ore to a size suitable for beneficiation in a roasting furnace.

³⁹ ‘Transvaal Silver Mines’, *The South African Mining Journal*, Vol. 1, (5 December 1891), p. 161.

⁴⁰ ‘Transvaal Silver Mines’, *The South African Mining Journal*, Vol. 1, (24 October 1891), p. 63. Refer to Appendix 1 for an explanation of the technical terms.

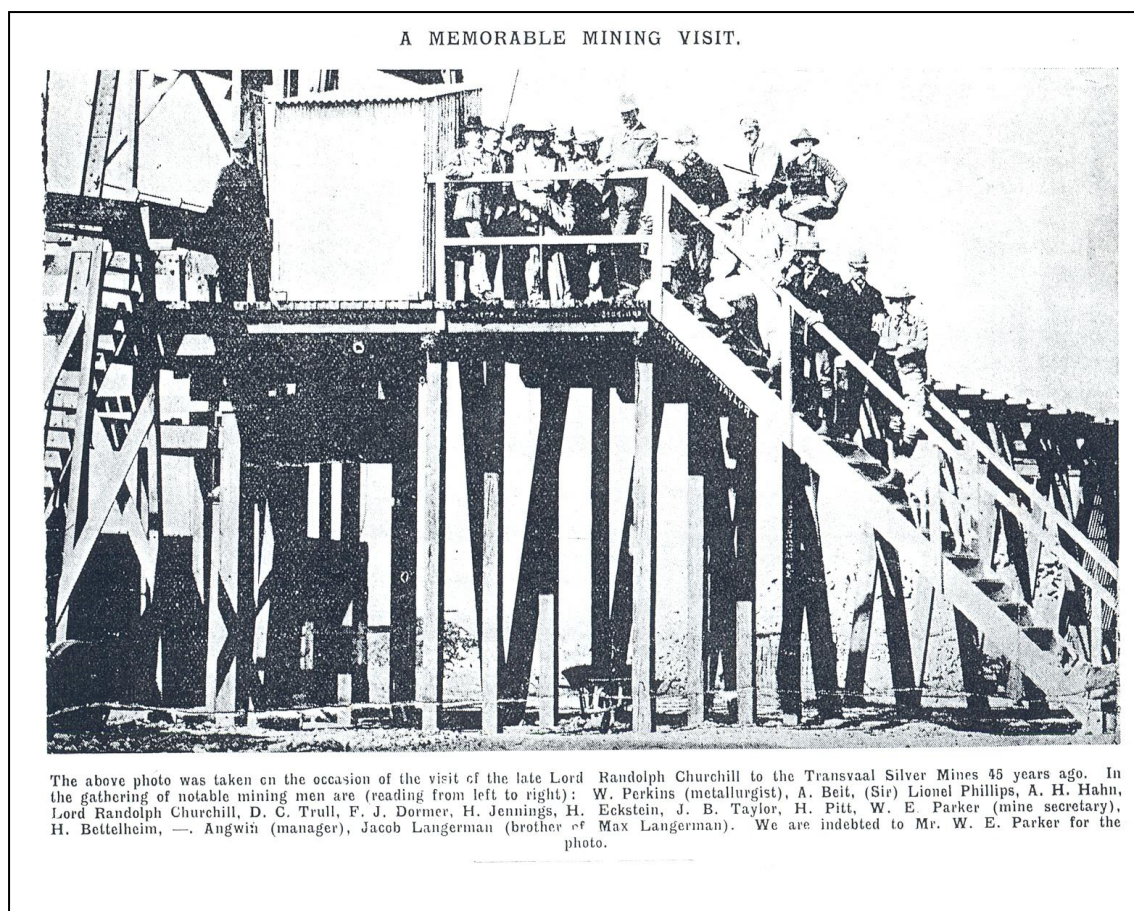


Fig. 23 Historical photograph of the visit by Lord Randolph Churchill to the Transvaal Silver Mines Ltd sometime in 1891.⁴¹ Many of the men in the photograph are mentioned in the text of the dissertation.

By August 1891, the working relationship with Hahn and the underground manager, Andrew Angwin, was souring. Comments by Phillips to Beit in the letter books such as: “Hahn is doubtless a good metallurgist but quite useless in ordinary management and fearfully crotchety”⁴² and “Hahn is absolutely useless except in his own particular branch and Angwin is too slow”⁴³ became typical comments. By December Phillips was writing “once he [Hahn] gets outside his furnaces he becomes absolutely useless...Hahn is absolutely incompetent as a general manager.”⁴⁴ It is possible Hahn was out of his depth as the general manager, as his background was as a metallurgist of a mine, rather

⁴¹ ‘A memorable mining visit’, The SA Mining and Engineering Journal, (25 January 1936), p. 695. Churchill’s book *Men, Mines and Animals in South Africa* 3rd edition 1893, mentions the visit and also provides a brief discussion on the silver mining industry of the 1890s.

⁴² Archives of H Eckstein & Co Ltd. Volume HE 149, p. 777, 3 October 1891.

⁴³ *Ibid.*, p. 789, 10 October 1891.

⁴⁴ *Ibid.*, p. 869, 27 December 1891.

than a mine manager. It appears from the comments by Phillips that he could not manage a mining and surface operation simultaneously and was therefore upsetting Angwin, the underground manager. Hahn chose to ignore instructions or advice from Jennings, the group consulting engineer, which as far as Phillips was concerned, was the final error in judgement by Hahn. Both Hahn and Angwin would eventually be replaced.⁴⁵ It is not known what became of Hahn, but Angwin was by 1893 the general manager of George Farrar's gold mine - East Rand Proprietary Mine (ERPM) - in Boksburg. Whether his appointment to ERPM was because of Farrar's connection to the silver mines at Argent is not clear, but it is probable.

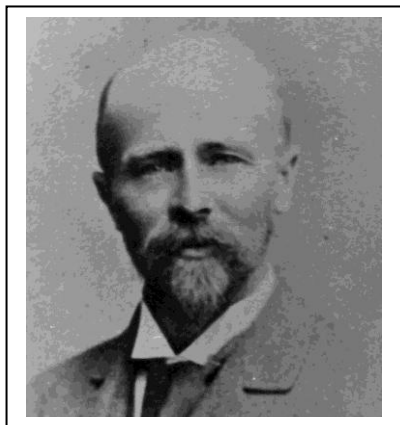


Fig. 24 Andrew Angwin, in 1893 as general manager of the ERPM gold mine, Boksburg and formerly underground manager at the Transvaal Silver mine.⁴⁶

In the 17 October 1891 edition of *The South African Mining Journal*, mention is made of a new syndicate being formed, named the Witpoortje Syndicate. The Witpoortje Syndicate⁴⁷ operated the Brakfontein and Boschpoort mines on farms of the same names, which adjoined the Dwarsfontein farm, where the Transvaal mine was located. From the Registrar of Companies files in Pretoria, it has been possible to establish that the original directors of the syndicate were George Farrar, Charles Parker, Charles Marx, Henry Curtis Small, Herman David and Anthony Devenish. With the exception of George Farrar no biographical details have been found on the others named.

It would seem that mining/prospecting operations at Boschpoort began in late 1890 or early 1891. In a letter to Beit on 3 January 1891 Phillips mentions Boschpoort for the first time:

⁴⁵ Archives of H Eckstein & Co Ltd. Volume HE 149, p. 919, 19 March 1892.

⁴⁶ Barlow Rand Library. Miscellaneous photographs.

⁴⁷ The Witpoortje Syndicate held lease options on four 'silver farms', but only two of them, namely Brakfontein and Boschpoort, are discussed in this dissertation.

At Boschpoort on the other side of the Transvaal Silver they have struck a lode about 18" wide which gives marvellous results. Assays varying from 1000, 800, 450 to 200 ozs! The farm is in the hands of a syndicate here, Farrar, Marx, Ross, Trull etc., who also holds Brakfontein, another farm on which lead has been struck. The district is certainly a very promising one.⁴⁸

By April the syndicate had sunk a shaft on the vein and invited Phillips to inspect the mine after which he informed Beit in his letter of 1 April 1891 that he was impressed with the two veins, although it required more development to determine the full potential of the deposit: "I was allowed to go down the shaft. It is 71ft. deep...there are two veins of rich lode matter to be seen one about 2ft., the other about 1ft. in thickness but it is quite undefined as yet. Mr Hahn [mine manager of the Transvaal mine] thought well of the ore."⁴⁹ By the middle of April the syndicate had accumulated sufficient ore to ship - approximately 50 tons - and Phillips mentions the shipment in a general letter. He adds that they were selecting the ore and that it would probably show exaggerated values of silver.⁵⁰

Unfortunately very little was ever published regarding the activities of the syndicate and most of the detailed information has been gained from the letter books of Lionel Phillips. In May, the syndicate approached Phillips with a proposal that he invest with them. It was arranged for Eckstein's consulting engineer, Hennen Jennings, to investigate the various prospects. Phillips, in a letter to Beit, states: "Boschpoort seems a good thing and they have three other farms, the pick of the district as far as surface goes as they were first in the field."⁵¹ Writing to Werner (Beit's partner in London) later in the month, he appears to have agreed to join in the syndicate, subject to Jennings' report being favourable. Interest shown by Rudd (partner of Rhodes) of Gold Fields and Beit wrote that Rudd wanted a quarter interest in the venture. However, Farrar was only interested in the Eckstein group becoming an investor in the Witpoortje Syndicate. Phillips recounts how: "Farrar was the largest shareholder and his opinion carried great weight with the rest of the syndicate."⁵²

⁴⁸ Archives of H Eckstein & Co Ltd. Volume HE 149, p. 505, 3 January 1891.

⁴⁹ *Ibid.*, p. 627, 1 April 1891.

⁵⁰ *Ibid.*, p. 636, 10 April 1891.

⁵¹ *Ibid.*, p. 649, 24 April 1891.

⁵² *Ibid.*, p. 669, 30 May 1891.

Jennings' report was highly favourable, describing Boschpoort and Brakfontein as 'a first class gamble'. Phillips then bought into the syndicate and probably became the second largest shareholder after Farrar. A letter in June 1891 gives an indication of the richness of the deposit:

The assays run remarkably high. The average value of ore shipped about 175 ozs to the ton, the remainder of the ore (considered seconds), 78 ozs. Of this grade ore but little would be needed to get ones money back. Brakfontein dump assays 60% lead and 26 ozs of silver and the lode is very strong. I am strongly in favour of doing the business.⁵³

By August the shaft at Boschpoort had been sunk to 46 m, resulting in exposure of the lode. It was very small, around 25 cm, of which 15 cm was galena. The silver content was 2.38 kg per ton. During this time the prospecting continued on the Brakfontein mine.

Although it was narrower than the Transvaal mine lode, the Boschport lode averaged 4.25 kg per ton silver. The capital of the syndicate was £16 000 and the managing director was JC Parker. Apparently, in the early days of the syndicate, Parker was concerned, as the company secretary GH Trotter had met losses on the stock exchange by embezzling a thousand or so pounds of the syndicate's cash and at the time of the report Trotter was in gaol awaiting trial.⁵⁴ A letter by Phillips gave details of the fraud. It is interesting how Trotter committed the fraud and the measures Phillips took to ensure such a fraud could not happen again:

The Secretary of the syndicate has been arrested for embezzlement, I think he has been speculating with the funds of the syndicate but do not expect from present information that we will suffer a serious loss. He did it cleverly as a requisition for wages came from the mine, is passed by the bond bearer, cheque drawn, etc. He drew two cheques for the same amount getting different directors to sign them. In future with all our companies I intend to make the directors sign the requisition as well as the cheques. It was a daring thing to do and only came out (as usual) by accident.⁵⁵

Towards the end of 1891 Phillips wrote a detailed letter about the farms in the syndicate. Discussing Boschpoort, he states that the lode had widened to 60 cm with the

⁵³ Archives of H Eckstein & Co Ltd. Volume HE 149, p. 680, 7 June 1891.

⁵⁴ 'Witpoortje Syndicate', *The South African Mining Journal*, Vol. 1, (17 October 1891), p. 49.

⁵⁵ Archives of H Eckstein & Co Ltd. Volume HE 149, p. 777, 3 October 1891.

galena (lead sulphide) being about 25 cm wide and the ore assayed at 57% lead and just over 390 g per ton silver. The letter makes it clear that Brakfontein was the syndicate's prime property and Phillips mentions that they will have to "...to buy the freehold of Brakfontein for £14 000 or abandon the farm." Regarding the prospecting on the other leases of the Witpoortje Syndicate he was not very hopeful and all work was stopped on the other farms. As the funds of the syndicate were low with "...only about £2 500 working capital left...most of the members are in favour of floating Boschpoort."⁵⁶

A decision was made by the directors to drive about 31 m from the shaft on Boschpoort and then float the company. It seems that Phillips wanted to extend the development for a few months more, but other members of the syndicate were keen to float the company and in the end Phillips relented. In a letter in November 1891 Phillips wrote: "Witpoortje syndicate shares have been dealt in at over £600...if we let them float part of the concern for say £120 000 with £50 000 working capital subsidised at par I should not be surprised to see the shares go over par in a brisk market."⁵⁷

By December 1891, at a special General Meeting of the shareholders, Lionel Phillips had obviously purchased a substantial holding of shares in the syndicate because he presided at the meeting. Others present were Messrs. Hermann David, Sidney H Farrar (brother of George Farrar), V Robinson, Charles Marx, F von Hessert and B Lazarus. Together they represented seventy-five percent of the capital. The share capital of the syndicate was increased from £16 000 to £17 600. It was also stated at the meeting that after further development on Boschpoort it was planned to float the company in March of 1892.⁵⁸ The results of the first shipment of concentrates by the mine were given in the 11 June 1892 issue of *The South African Mining Journal*. The shipment yielded an average of 60% lead and 4.34 kg per ton silver.⁵⁹

At the same time that development was taking place on the Brakfontein and Boschpoort mines, the Transvaal mine was developing two separate areas. The Transvaal mine was down to 71 m level with drifts east and west in strong lodes. The width of the lode

⁵⁶ Archives of H Eckstein & Co Ltd. Volume HE 149, p. 804, 24 October 1891.

⁵⁷ *Ibid.*, p. 834, 14 November 1891.

⁵⁸ 'Witpoortje Syndicate, Ltd', *The South African Mining Journal*, Vol. 1, (19 December 1891), p. 190.

⁵⁹ 'Witpoortje Syndicate, Ltd', *The South African Mining Journal*, Vol. 1, (11 June 1892), p. 653.

of 123 m north and south of the shaft, with an average lode width of 1 m, but were up to 2.76 m in places, above the 40 m level stoping (mining of ore) was carried out.⁶²

A great deal of development work had taken place both above and underground in 1891, but as so often happened with the silver mines of the greater Pretoria region the amount of working capital was underestimated for the work needed to bring the mine to economic production. The result, as with the Willows and Albert mines, was the Transvaal mine ran into a significant cash flow problem. The most likely cause was the development of the smelting operation and the large expenditure involved in smelting the ore. Although Hahn was supposed to be the expert, it appears that he may have lacked specific knowledge for the task. He had considerable difficulty understanding that the local cokes did not have a sufficient calorific value for the furnaces that he designed, in other words the heat generated by the local coke was lower than imported coke and this meant longer roasting times. His designs were probably based on those of overseas furnaces which ran on better grades of coke. The result was that the company had to import 'Cardiff smelting coke', and this led to questions about the viability of the smelting operation. Hahn was under great pressure to resolve the situation, but it would not improve until the middle of 1892. The company borrowed £25 000 for working capital, although there was a considerable tonnage, (50 000 tons) of ore 'at grass,' with average values of 23% lead and 0.74 kg per ton silver.⁶³ Based on the values of the two metals in 1892 this would have given an approximate value for the ore stockpile of £355 000.

In his second annual report, Otto Hahn the general manager, (see Appendix 5 for full version of the report) commented on the difficulties of obtaining good coke and furnace bricks.⁶⁴ The main part of his report dealt with the development work on the smelting and reduction works at the mine. The report presents a great deal of detailed information of the type of equipment, the process, and the numbers of men employed on the mine. The detail regarding the buildings is of particular importance when combined with the

⁶² Archives of H Eckstein & Co Ltd. Volume HE 5, Annexure 19-20. Chairman's report to 3rd AGM of shareholders. 21 April 1892.

⁶³ 'At grass' is a mining term used to define an amount of ore stockpiled on the surface prior to being processed.

⁶⁴ Archives of H Eckstein & Co Ltd. Volume HE 5, Annexure 19. General Manager's report to 3rd AGM of shareholders. 8 April 1892.

information on the surface plan of the mine (Fig. 21), as it formed part of the research used for the archaeological excavations conducted at the Transvaal mine. These two historical documents contributed to the formulation of the excavation model which formed part of the excavation plan.⁶⁵ In the report by Hahn the men's single quarters were described as follows:

...the white men's quarters was also constructed...of wood and iron, and occupies an area of 175 ft. x 26 ft. It contains a dining hall, two rooms for boarding house attached, and 24 rooms for 2 workmen each. The rooms are all lined with brick, whitewashed, and provided with wooden ceiling and floor. The kitchen, which is separated from the dining-room by an open air space, is also of wood and iron, and is 22 ft. x 12 ft. x 10 ft. high.⁶⁶

This description complements the results of the archaeological excavation of part of the single quarters, where pieces of plaster and corrugated iron were found. As the building was destroyed by fire during the Anglo-Boer War, all traces of the wooden floor and ceiling would have been destroyed. The report presents a huge amount of detail regarding the buildings, their size and use and in some cases approximate locations. No trace of any structures of the reduction works has been found, but the report mentions that it:

...was located by Mr Jennings and the writer on the 21st of July, at a distance of 700 yards to the north-east from the Main Shaft. Grading was commenced soon after, and stone foundations laid for two tall chimney-stacks, one for the roasters, and one for the smelter, as soon as the company's quarry was cleaned out and put in shape for furnishing building stone.⁶⁷

The description also provides a clue as to the location of the quarry from which the stone was obtained for the dressed stone foundations of many of the buildings. The photographs of the Anglo-Boer War damaged 1890s buildings (which are included in the next chapter) show that the buildings had dressed stone foundations. This fact is significant as it corroborates the statement above about the use of building stone. To date such a quarry has not been found, and it probably disappeared under one of the 1920s dumps of waste rock or crushed slimes.

⁶⁵ G Reeks, 'Report on the Historical Archaeology Excavations of the Argent Silver Mine', Unpublished excavation report submitted to South African Heritage Resources Agency (SAHRA), as a component of the research for this MA dissertation.

⁶⁶ Archives of H Eckstein & Co Ltd. Volume HE 5, Annexure 19. General Manager's report to 3rd AGM of shareholders. 8 April 1892.

⁶⁷ Archives of H Eckstein & Co Ltd. Volume HE 5, Annexure 19. General Manager's report to 3rd AGM of shareholders. 8 April 1892.

The report mentions the manufacturing of bricks on site. It describes the construction of a brick furnace and that they also produced crude, low fired or sun-dried brick on the site. This coincides with the archaeological evidence of low and medium fired bricks which have by association, with dateable structures, been identified as coming from the 890s period. The description of the houses in the report mentions that they were built “of wood and iron with a lining of sun dried brick”:⁶⁸

The waste of brick burnt in the ordinary open field-kiln was so large that it was considered advisable to build a brick-kiln, with stationary fire-places, which gives better satisfaction in every respect...One brick kiln, 21ft. 10in. x 16ft. 3in. and 14ft. high, of stone and brick. Has a capacity of 22,000 bricks, which are baked in 50 hours.⁶⁹

The company had to be relatively self-sufficient in food stuffs - primarily due to the location of the mine 100 km east of Johannesburg - so they practised vegetable farming. The results were not always successful as the extract explains: “The Company has about 65 acres of ground under cultivation, mostly with mealies. The growing of vegetables is only a moderate success, the vermin getting the lion’s share.”⁷⁰ The sources make no mention of animal husbandry but it is fairly safe to assume that the mine also kept cattle and either sheep or goats.

From a social point, the health of the workers and the accident rate were costly concerns to the management. It appears that until 1892 the death rate had been due to various diseases rather than mining related accidents, as the extract of the general manager’s report for 1892 states:

The health of the men has not been as good as the salubrious climate of this region would lead one to expect, yet only one case of serious illness has come under my notice, viz., one of typhoid fever. There have been two deaths among the white men from natural causes, one of heart disease, and one of consumption. Among the natives pneumonia seems to prevail to a large degree, and there have been six deaths as a consequence of it. Of accidents there are fortunately only two to record, one to a white man who was struck by a loose

⁶⁸ Archives of H Eckstein & Co Ltd. Volume HE 5, Annexure 19. General Manager’s report to 3rd AGM of shareholders. 8 April 1892.

⁶⁹ *Ibid.*

⁷⁰ *Ibid.*

rock while timbering the shaft, and one to a native, neither of a fatal nature but both expensive to the company.⁷¹

Pneumonia, typhoid and consumption [tuberculosis] would have been some of the main killers in the nineteenth century. The lack of antibiotics and poor housing/living conditions would have meant almost certain death, once contracted, from the diseases. It is possible that death from tuberculosis among the miners was incorrectly diagnosed, the real cause being death from silicosis or the inhalation of quartz dust. This disease eventually destroys the lung tissue and a person's ability to breathe. A similar, but more debilitating variety of the disease is known as phthisis, which results in the loss of body weight as well as the ability to breathe. Both of these lung ailments would lead to the deaths of tens of thousands of mine workers on the Witwatersrand from the 1890s through to modern days, although the symptoms are more readily recognised today and modern precautionary measures have significantly reduced the death rate. By 1902 the Chamber of Mines recognised three diseases as the biggest killers of the black labour force on the mines, with pneumonia, the largest killer, accounting for 41.7% of deaths. The second and third killers respectively were diarrhoeal diseases at 20.5% and scurvy at 12% and these were due almost solely to poor diet and poor living conditions.⁷² Death from silicosis was largely unrecognised at this time and was largely denied by the mining industry as the prime cause of pneumonia-like deaths. Part of the reason for this denial would most probably have been culpability and the possible pension repercussions for the mining companies.

The final element of social importance in Hahn's annual report is that it lists the number of employees and their occupations:

The working force under the mine manager consists of 17 white men, comprising miners, engine-drivers, tool-sharpeners, carpenter and smith, and 200 or more natives.

At the reduction works there are employed, 1 construction engineer, 3 fitters, 8 carpenters, 1 blacksmith, 4 masons, 3 bricklayers, and in connection therewith, at ore floors, brickyard, clay-pits, and quarry:--

⁷¹ Archives of H Eckstein & Co Ltd. Volume HE 5, Annexure 19. General Manager's report to 3rd AGM of shareholders. 8 April 1892.

⁷² J Lang, *Bullion Johannesburg – Men, Mines and the Challenge of Conflict*, pp. 146-147.

13 additional white men. Total 33 white men and 120 natives. The official staff consists of four clerks.⁷³

Thus the total workforce at the Transvaal mine in 1892 was 55 whites including the mine manager and 320 black workers. These numbers make it a significant employer for the 1890s. It is interesting that the places given for employment of the men included the brickworks and quarry, thus confirming other sources that the company made its own bricks and also quarried and dressed stone. Only one other report dealing with employees and occupations was found during the extensive research that was carried out for this dissertation and that was at The Willows mine (see previous chapter).

About 3 km north of the Transvaal mine, on a different portion of the farm Dwarsfontein, is another argentiferous lead lode. Although no details have been found of any active mining on this deposit prior to 1900, a company - the Pretoria Silver and Lead Company Ltd - was registered in 1892 and appears in the Registrar of Companies files. The reason for mentioning it is that the deposit did become active again in the early 1900s, although this is the earliest reference to the deposit.⁷⁴ It has not been ascertained what became of the 1892 Pretoria Silver and Lead Co. It is known that the invested capital was £60 000, which was a substantial amount in 1892. The directors were listed as Ludwig Ehrlich, David J Pullinger, Egbert J Kock, Benjamin Courtney and WA Tilney, (once again no biographical notes). There was a George Tilney, who had been an original director of TSM under the Barnatos; perhaps he was related to WA Tilney. The likely scenario for the apparent failure of this mine in the early 1890s is that its development occurred when the price of lead and silver was collapsing on the local and international metal markets. A new company with a similar name was opened in the early 1900s and the detailed story of it will form part of the next chapter.

From the unknown members of the board of directors of the Pretoria Silver and Lead Company the discussion moves to the veritable '*Who's Who*' of Randlords and mine owners, that attended, or were represented by proxy at the 3rd AGM of the Transvaal Silver Mines Ltd in April 1892. Among those present were Lionel Phillips, George

⁷³ Archives of H Eckstein & Co Ltd. Volume HE 5, Annexure 19. General Manager's report to 3rd AGM of shareholders. 8 April 1892.

⁷⁴ Registrar of Companies, Pretoria, File 01/00579/06, Pretoria Silver and Lead Co Ltd, Registered 19 December 1892.

Farrar, Carl Hannau, Otto Beit, Friedrich Eckstein and Edouard Lippert. As shareholders, represented by proxy, were Hermann Eckstein, JB Taylor, Alfred Beit, Sidney Farrar, Max Michaelis, Henry King and Sigismund Neumann.⁷⁵

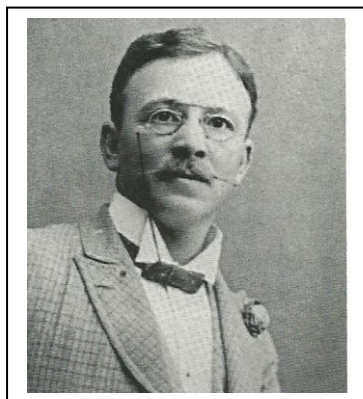


Fig. 26 Barney Barnato.⁷⁶

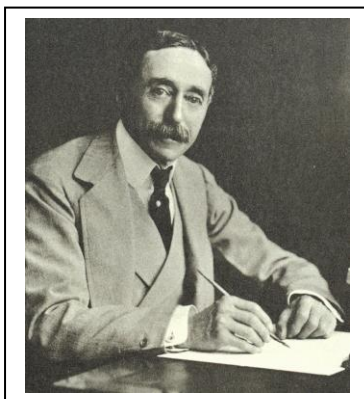


Fig. 27 Lionel Phillips.⁷⁷

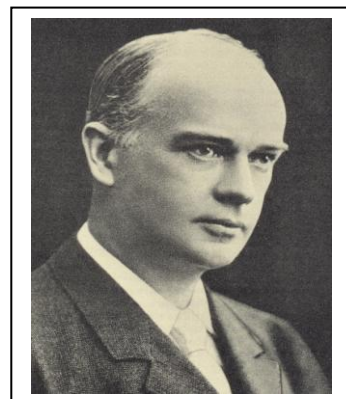


Fig. 28 Hennen Jennings.⁷⁸

The men who controlled the silver mining industry in the 1880s - 1890s and who were also involved with the Transvaal Silver Mines Ltd.



Fig. 29 Hermann Eckstein.⁷⁹

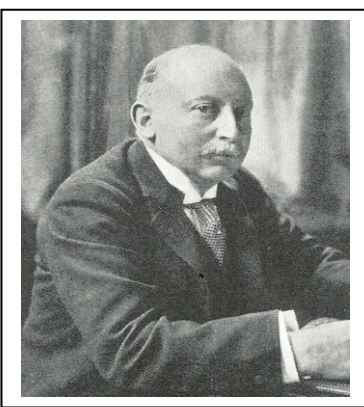


Fig. 30 Alfred Beit.⁸⁰

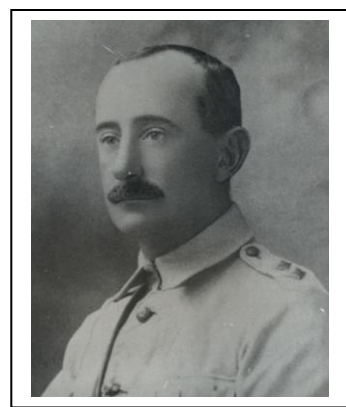


Fig. 31 George Farrar.⁸¹

⁷⁵ Archives of H Eckstein & Co Ltd. Volume HE 5, Annexure 20. Report to 3rd AGM of shareholders. 21 April 1892. See also Biographical notes on all of those listed which is to be found in Appendix 2.

⁷⁶ RI, Rotberg, *The Founder – Cecil Rhodes and the Pursuit of Power*, plates between pp. 42-42.

⁷⁷ AP, Cartwright, *The Corner House-The Early history of Johannesburg*, p. 87.

⁷⁸ *Ibid.*, p. 96.

⁷⁹ *Ibid.*, p. 64.

⁸⁰ M, Meredith, *Diamonds, Gold and War - The Making of South Africa*, plates between pp. 270-271.

⁸¹ Barlow Rand Library – miscellaneous photographs.

On 25 June 1892 Phillips wrote to Beit a long detailed letter with the results of assay samples taken in the mine, they clearly show that the richest part of the mine was on the first level at 40 m.⁸² Much of the excitement dealing with the richness of the mine was based on the first two years of development, which would have been in the upper levels of the mine. With hindsight it becomes clear that although the deposit was very rich and would continue to be so throughout the life of the mine, both in the 1890s and 1920s, the above average or richest part of the mine was on the first level.

The two smelting furnaces were in operation by July 1892 and were treating about 75 smelting charges per day, each charge consisting of about 680 kg, thus about 25 tons per day for each furnace. The daily yield of lead bullion was expected to average about 8 tons from each furnace. The bullion was cast into 51 kg bars, assaying silver at 4.5 kg per ton.⁸³ The *SA Mining Journal* reported that over 80 tons of silver-lead bullion had been produced from just one of the smelters.⁸⁴

Towards the end of 1892 a letter was sent to all shareholders detailing the progress made at the mine. It mentions that both blast furnaces were in operation and that 360 tons of bullion had been produced, containing approximately 1 187 kg silver and 358 tons of lead. When the original scheme for smelting had been proposed by Hennen Jennings, he had stated that a problem might exist with local coal/coke and advised testing it before finalising the designs of the furnaces or roasting ovens, but this does not appear to have been done. The report mentions that the initial charges were with imported coke, but that the local coke, when tested, was found to be only 10% inferior to the imported coke. The cost of the local coke was only about one third of the imported coke. It was also reported that all smelting operations had been suspended pending the completion of contracts for the local supply of coke.⁸⁵

Neither of the surface mine plans indicate the location of the smelters or roasting ovens, but one account published in *The South African Mining Journal* does give a clue to its

⁸² Archives of H Eckstein & Co Ltd. Volume HE 150, p. 83, 25 June 1892.

⁸³ 'Financial & General Notes', *The South African Mining Journal*, Vol. 1, (30 July 1892), p. 785.

⁸⁴ 'Transvaal Silvers', *The South African Mining Journal*, Vol. 1, (6 August 1892), p. 799.

⁸⁵ Archives of H Eckstein & Co Ltd. Volume HE 5, Annexure 21. Letter to Shareholders, 30 September 1892.

general position. It describes how the ore was dressed to three grades and then taken from the shaft to the smelting plant situated about 650 m northeast of the shaft; this would put it close to the site of the 1920s smelter.⁸⁶ This source also confirms the statement in the 1892 annual mine manager's report by Hahn that the reduction plant was located 640 m to the northeast of the main shaft.⁸⁷

By October 1892, the problem of a good supply of local coke had still not been fully resolved and although the roasting furnaces were in operation, the smelters were not. It was decided to suspend mining operations, because of the large quantities of ore 'at grass.' The only underground work carried out up to this time had been development work, and the mine was now in a position to exploit the 'backs' or mineable areas for many years.⁸⁸ Lack of coke or coal supplies created a situation where they could not run the roasters and smelters at the same time this led to huge stockpiles of ore 'at grass.' The mine was well developed and had sufficient ore 'in sight' to supply the roasters/smelters for 3-5 years, no further underground development was necessary and operations were suspended in October 1892.⁸⁹ Again this lack of control or balance of the surface and underground development would have created significant operational difficulties. The company was either mining ore or smelting the ore but neither operation at the same time and so labour time and utilisation would have been wasted and costly.

At the end of December 1892 it was reported in *The SA Mining Journal* that the smelting operations were to commence again in January 1893. It was also stated that a large amount of ore had been roasted and that a supply of good coke had been sourced locally.⁹⁰ However, by 21 January 1893 the same journal reported that owing to the great depreciation in the value of lead and silver since the smelting works was first proposed, it had been decided to stop the smelting operation at the mine.⁹¹ Added to the

⁸⁶ 'Transvaal Silver Mines', *The South African Mining Journal*, Vol. 1, (3 September 1892), pp. 863-866.

⁸⁷ *Ibid.*

⁸⁸ *Ibid.*

⁸⁹ 'Transvaal Silvers Co', *The South African Mining Journal*, Vol. 2, 29 October 1892, p. 69.

⁹⁰ 'Transvaal Silvers', *The South African Mining Journal*, Vol. 2, 24 December 1892, p. 195.

⁹¹ 'Transvaal Silver Mines', *The South African Mining Journal*, Vol. 2, (21 January 1893), p. 257.

downturn in the value of the smelted metals was the large increase in import duties payable on the imported coke and the failure of local suppliers of coke to meet the demands for the smelters and roasters at a reasonable cost. It was decided to erect an ore dressing and concentrating plant and to export the concentrates, rather than smelt on site. The former consulting engineer to the mine and now group consulting engineer, Hennen Jennings, favoured such a proposal.⁹²

An article appeared in the 24 December 1892 edition of *The Standard and Diggers' News* in which it commented on a shareholders meeting of the Witpoortje Syndicate Ltd.⁹³ It stated that Farrar had announced that the properties of the syndicate, of which the Boschpoort and Brakfontein mines were the most important, would be closed down to await the results of the new system of concentrating the ore to be adopted at the Transvaal mine. If the new system of beneficiation was successful a similar plan would be followed by the Witpoortje Syndicate. *The Standard and Diggers' News* was one of the earliest newspapers on the Witwatersrand and it was nearly always anti-management in its approach and therefore its articles have to be read objectively. The reference follows the disclosure by the Transvaal mine in *The South African Mining Journal* that its smelting operation was to be closed down and a concentrating plant and process installed instead. The editor of *The Standard and Diggers' News* was concerned that Farrar and the directors of the Witpoortje Syndicate had decided to close the mine down and play a 'wait-and-see' game with Transvaal mine, regardless of the wishes of shareholders. While it would appear that this was true, one has to remember that the syndicate and Transvaal Silver Mines Ltd had a number of common directors, who were also the largest shareholders of both companies. No details of operation of the Witpoortje Syndicate after December 1892 have been found.⁹⁴ However, the records of the Registrar of Companies show that the company was only liquidated in 1909 and for which no explanation has been found.

Returning to the story of the Transvaal mine, in early 1893 correspondence was published in which shareholders of the Transvaal Silver Mines Ltd expressed their disbelief at the explanations given for the closure of the smelters and the need to install

⁹² 'Transvaal Silver Mines', *The South African Mining Journal*, Vol. 2, (21 January 1893), p. 257.

⁹³ 'Transvaal Silver Mines Again', *The Standard and Diggers' News*, 24 December 1892.

⁹⁴ Archives of H Eckstein & Co Ltd. Volume HE 5, Annexure 2, 24 December 1892.

a concentration plant as an alternative method of processing the ore. The mine had been over-developed, but the smelters were never fully functional, primarily due to a lack of local supplies of coke. It seems clear though that the advice of Hennen Jennings to test local supplies of coal/coke and obtain assurances of supply before committing to smelting were ignored. Was Hahn the main culprit, or was it bad directorial management – probably both, but Hahn was expendable and would soon be sidelined and then dismissed. Clearly Jennings, as group consulting engineer, was also at fault for not having followed up on his advice to test the coke before allowing the order of the new smelting ovens. One of the major mistakes though was not to enter into contracts for the supply of local coke before the expenditure of building the costly roasting and smelting plant.

It was mentioned in *The South African Mining Journal* dated 4 February 1893 that the new general manager – E Wertheman - was due to arrive shortly and that a general meeting of shareholders would then be called. No mention was made of Otto Hahn, the former general manager.⁹⁵ In March 1893, the chairman, Lionel Phillips, stated that towards the end of December 1892 the company had shipped 289 tons of lead bullion and 266 tons of ore, which were expected to give a return of £10 000. There was lead bullion and ore in shipment, or at the mine waiting to be shipped, which was expected to yield a further £12 600. There was also 18 000 tons of ore ‘at grass’ containing an average of 20% lead and 750 g per ton silver. Lionel Phillips continued by stating that Otto Hahn, their general manager, had presented them with details that the ore contained only 3% sulphur and that by simply roasting it, it could be rendered suitable for smelting. After trials it was found that the ore in fact averaged closer to 8% sulphur.⁹⁶ This meant that the roasting time would have to be longer and would require more heat, which in turn meant larger amounts of coke with no corresponding increased yield in silver and lead. This raises the question of how such a supposedly ‘experienced and expert’ smelter made such a costly and time consuming mistake.

After the commissioning of the smelters, the international market price of silver fell by 4 pence per 30 g and the price of lead by £2 per ton, leading to a drop of £2 800 in

⁹⁵ ‘Financial & General Notes’ *The South African Mining Journal*, Vol. 2, (4 February 1893), p. 290.

⁹⁶ Archives of H Eckstein & Co Ltd. Volume HE 5, Annexure 22. Chairman’s report to 4th AGM of shareholders. 9 March 1893.

monthly profits.⁹⁷ Although the richness of the ore meant that the mine was still profitable, the need for a longer period of roasting also meant that more furnaces would have had to be installed to roast the same quantity of ore in the same time period, costing, it was estimated, a further £20 000. The Board therefore decided to suspend smelting operations and to install a concentration plant and ship the concentrates. It was expected to have the plant installed by August 1893. The Board employed Wertheman on a one-year contract. According to Phillips, Wertheman was "...a gentleman who had considerable experience in the treatment of that class of ores" and he was to replace Otto Hahn as general manager.⁹⁸ In 1891, Phillips had said that Hahn was a man who had come with the highest recommendations of his ability, a man with twenty years experience in the smelting of lead and silver ores!⁹⁹ This raises the question of whether Phillips was misled in the capabilities of Hahn or he was incapable of determining the requirements of a manager/smelter for the mine – it was probably both. In January 1893 Wertheman left for Europe to order the concentrating plant. Hahn lost his position primarily because of the mistake regarding the quantity of sulphur in the ore which created the roasting problems and his services were terminated on the 1 April 1893.¹⁰⁰

The mine continued to smelt ore until all roasted ore was converted and in April 1893 the company shipped 338 tons of lead bullion and 68 tons of sorted ore to Europe.¹⁰¹ By July 1893 the new ore dressing and concentrating plant, consisting of some 250 tons of machinery, arrived at the mine.¹⁰² At the beginning of August 1893 the decision was made to suspend all mining work underground, except the pumping, until such time as the concentrating plant had proved itself. Shutting down underground operations would reduce the running costs of the mine. At the end of September 1893 *The SA Mining Journal* reported that the concentrating plant was in the process of being commissioned

⁹⁷ Archives of H Eckstein & Co Ltd. Volume HE 5, Annexure 22. Chairman's report to 4th AGM of shareholders. 9 March 1893.

⁹⁸ *Ibid.*

⁹⁹ Archives of H Eckstein & Co Ltd. Volume HE 5, Annexure 18. Report to 2nd AGM of shareholders. 9 April 1891.

¹⁰⁰ *Ibid.*, Annexure 23. Chairman's report to 5th AGM of shareholders. 29 March 1894.

¹⁰¹ 'Transvaal Silver Mines', *The South African Mining Journal*, Vol. 2, (15 April 1893), p. 451.

¹⁰² 'Transvaal Silvers', *The South African Mining Journal*, Vol. 2, (22 July 1893), p. 674.

and in November 1893 the plant was producing between 400 and 500 tons of concentrates per month.¹⁰³

During the switch from a smelting operation to a concentrating operation it appears that the decision to suspend underground development and mining was reversed, as 591 m of drifts were added on the 40 m level, 96 m of drifts on the 71 m level and 61 m of drift development on the 101 m level. The total ore raised was 7 737 tons, most of which came from the development of the drifts rather than stoping. The smelting process treated 1 418 tons of ore and resulted in 376 tons of lead bullion being shipped, with just under 10 tons of lead bullion prepared for shipment. The concentrating process by comparison treated slightly less than 6 000 tons of ore and resulted in 1 263 tons of concentrates being produced, of which 695 tons were shipped by the end of 1894, along with a shipment of 693 tons of untreated ore. By the end of the year there was approximately 20 000 tons of ore stockpiled at the mine.¹⁰⁴ Despite assurances by Wertheman, that the concentrating plant would cost less than £10 000, the account entries show that the cost was nearly £18 000. This was additional capital outlay on top of the failed smelting plant that had cost the company approximately £27 000.¹⁰⁵

The details above show that concentrating the ore was operationally far more viable than a smelting operation. Despite employing ‘experts’ in the reduction or smelting of ores, the directors of the various silver mines such as the Albert and Willows mines and the Transvaal mine were misled by these experts, into either spending huge amounts of money to construct smelting plants or the cost of operating reduction and smelting plants.

There was a need to realise the actual returns of all ore and concentrates shipped to accurately gauge the financial position of the company. During this period 29 517 tons of ore were treated, producing 4 364 tons of concentrates. The lower grade of the ore

¹⁰³ ‘Transvaal Silver’, *The South African Mining Journal*, Vol. 3, (14 October 1893), p. 22.

¹⁰⁴ Archives of H Eckstein & Co Ltd. Volume HE 5, Annexure 23. Chairman’s report to 5th AGM of shareholders. 29 March 1894.

¹⁰⁵ *Ibid.*

has to be seen against the falling international prices of silver and lead, with the value of silver sinking to its lowest on record.¹⁰⁶

In early 1894 the general manager, Wertheman, sent a report to the Board:

I have on previous occasions laid before your Board the unsatisfactory results of our research work and now draw your attention to the fact that the payable ore in your mine seems limited to one bunch of ore... Lateral exploration has failed so far to develop other bunches of industrial value, while, in depth, the main bunch gives out. ...I do not, at the ruling values of our product, deem it prudent to incur liabilities for the purpose of prospecting, and therefore advise you to suspend operations at the 'Transvaal Silver Mines'.¹⁰⁷

On this advice the Board decided to close down all mining and only continue concentrating operations, which closed down from the end of March 1895 as the price to which silver fell made the mine unprofitable to work. This led to Wertheman resigning at the end of May 1894, as he had nothing left to manage.¹⁰⁸

The mine was allowed to flood and from March 1895 the surface plant was put under the control of a caretaker. The mine was not liquidated as rents had been paid on the properties and the only reason for suspending all activities was the low price of silver and lead. It was expected that they would regain their former prices, at which time the mine could be re-opened. The chairman of the Board at the 6th AGM said that "...a word of praise was due to Mr Wertheman, as it was he who had turned the mine around and into a profitable position, unfortunately he had resigned following the closure of the mine."¹⁰⁹

As indicated in chapter 1, in January 1896 four of the directors of Transvaal Silver Mines Ltd were arrested as conspirators in the Reform Committee. The Jameson Raid and Reform Committee are discussed in chapter 1. They included Lionel Phillips

¹⁰⁶ Archives of H Eckstein & Co Ltd. Volume HE 5 Annexure 24. Chairman's report to 6th AGM of shareholders. 14 November 1895. See also the explanation of the collapsing silver market in 1892-93 on pages 2-5 of the dissertation due to the repeal of the Sherman Silver Act in 1893 and the economic depression in Johannesburg in 1892-93.

¹⁰⁷ *Ibid.*, Annexure 23. Report to 5th Shareholder's AGM 22 August 1901.

¹⁰⁸ 'Transvaal Silver Mines', *The South African Mining Journal*, Vol. 3, (7 April 1894), p. 412.

¹⁰⁹ Archives of H Eckstein & Co Ltd. Volume HE 5, Annexure 24. Chairman's report to 6th AGM of shareholders. 14 November 1895.

(chairman), George Farrar, Samuel W Jameson and HA Rogers. Phillips and Farrar were initially sentenced to death. Consider, the mine is in financial difficulties, its operations had closed down due to the depressed price of lead and silver, to a degree it has lost direction and then four of its six local directors are removed, including the chairman. This surely must have been a devastating blow to the Transvaal Silver Mines Ltd.¹¹⁰

The next reference to the Transvaal Silver Mines Ltd company is the report of the eighth AGM, held in August 1897, where the chairman RW Schumacher had virtually nothing to report. The mine and surface works were still closed down and there was very little prospect of opening in the short term due to the low international metal prices. Schumacher reported that the "...price of silver had continued to fall such that the world price had fallen to below 26 pence per ounce."¹¹¹ At this low price it was clearly uneconomical to operate the mine.

In August 1898, Friedrich Eckstein, brother of the deceased Hermann Eckstein, had taken over the chairmanship of the Transvaal Silver Mines Ltd. The ninth AGM was almost a repeat of the previous year. Questions were raised as to why the company was not liquidated and Eckstein stated that they had a mine with rents paid in advance and with equipment assets. If the price of silver recovered, they could easily re-open it, but in the longer-term, liquidation was a possibility. This appears to have been the last shareholder meeting before the outbreak of the Anglo-Boer War in October 1899.¹¹²

The 'Argent mines' were developed primarily with the capital of the Randlords in the 1890s. They were deeply involved with the daily management of the mines, but as with all of the silver mines of the greater Pretoria region, they were controlled by the fate of the international silver market and local political events in the mid-1890s.

The arrest and trial of the four directors following the Jameson Raid created a vacuum in mine management. Following the trial there was a lack of motivation to re-establish the mine, but research has shown that it was the depressed metal prices that were the

¹¹⁰ 'Imprisoned Directors', *The South African Mining Journal*, Vol. 5, (9 May 1896), p. 617.

¹¹¹ 'Transvaal Silver Mines', *The South African Mining Journal*, Vol. 6, (28 August 1897), pp. 1044-1045.

¹¹² 'Transvaal Silver Mines', *The South African Mining Journal*, Vol. 7, (3 September 1898), p. 997.

primary reason for the closure and not the de-motivation of the directors. The research was able to provide, from the annual reports of the Transvaal Silver Mines Ltd (which are part of H Eckstein & Co records), the tonnages of ore produced. Using the assay values from the reports, the potential tonnages of lead and silver for the 1890s period could be calculated. It was clearly a very rich mine producing some 61 000 tons of ore from which nearly 6 000 tons of lead bullion and high-graded lead ore were shipped overseas. The potential output of silver from this shipment was calculated at just over 17 tons.

The 1890s was the period of greatest prospecting and development of silver mines in the greater Pretoria region. The Willows mine produced 19 tons of silver in the same period. The difference was that the Transvaal mine continued producing silver in the twentieth century, whereas the Willows mine was not re-opened after 1900. Both mines would pass out of the control of H Eckstein & Co in the early part of the twentieth century and from 1910 the company would have no further interest in the silver mines of the greater Pretoria region.

Although the Transvaal Silver Mines Ltd ceased operating in 1895 it was still registered as a company until 1910. The four 'Argent mines' would experience different degrees of re-prospecting in the twentieth century, but all would become producers of silver and lead again over the next 57 years. This was a period that would see a succession of tribute miners until the Argent mines were re-structured and re-opened by the Albu brothers of General Mining and Finance Corporation in 1919, followed by Gold Fields in the 1950s. The story of the Argent mines will continue in the next chapter beginning with the period immediately after the end of the Anglo-Boer War in 1902, and continuing up to the final part of the history of the mines in 1999.

Chapter 4

THE ARGENT MINES 1900–1999

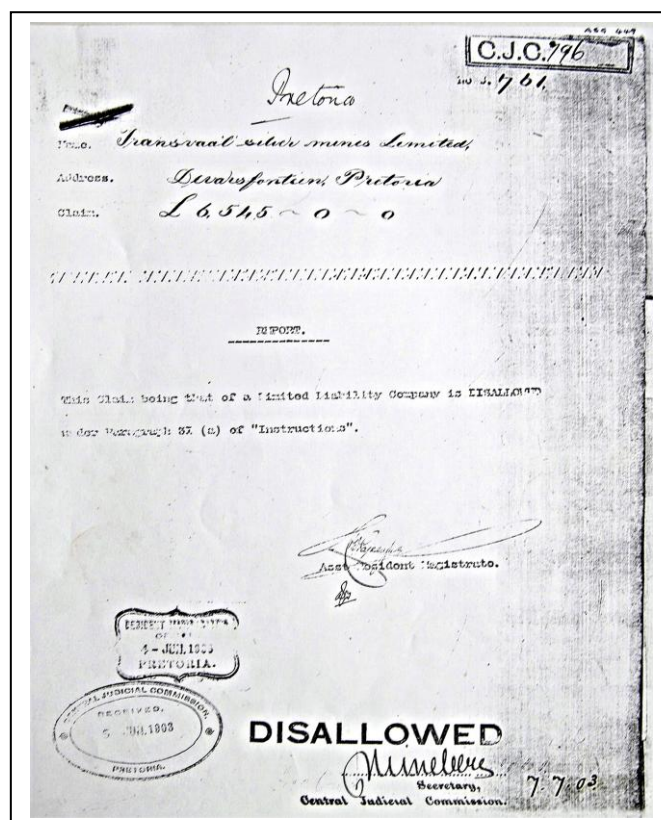
This chapter continues with the history of the Argent mines. The outbreak of the Anglo-Boer War on 11 October 1899, makes 1899 a natural closing point for the previous chapter, as all mining activities across the Witwatersrand and outlying districts ceased at that time. During the weeks leading up to the outbreak of war, share prices of all companies listed on the Johannesburg Stock Exchange had plunged, and by the end of September 1899 most gold mining company shares were listed at zero value. Although the mining operations of all of the silver mines in the Argent district, and specifically the Transvaal Silver Mines Ltd, had ceased by 1895, the company was still listed on the Johannesburg Stock Exchange in 1899.

During the one hundred-year period covered in this chapter - from 1900 to 1999 - the four mines of the area, namely the Boschpoort, Brakfontein and the two mines on the farm Dwarsfontein, i.e. the Pretoria mine and Transvaal mine, were to see a resurgence of interest and capital investment by minor mining companies working the mines on a tribute basis. There were also periods of major re-investment by General Mining Corporation from 1919 to 1927 and Gold Fields of South Africa in the 1950s and again in the 1970s. The investment in 1919–1927 was to produce not only the greatest development of the Argent mines, but also the largest output of silver at 45 tons. The war damages compensation claim by the Transvaal Silver Mines Ltd for severe damage done to mine buildings during the latter stages of the Anglo-Boer War is discussed and the chapter will continue with the history of these mines in the twentieth century, a period of World Wars, labour and political transition and global economic fluctuations.

During the Anglo-Boer War the mine buildings of the Transvaal mine were damaged either by British or Boer forces. The evidence indicates that the damage was perpetrated by British troops on 6 July 1901. An eyewitness report by Mrs Cathrina Roets, of the farm Dwarsfontein, was submitted by Transvaal Silver Mines Ltd to the claims officer of the Military Compensation Board. It formed part of the documentation in support of a

claim for war damages of £6 545.¹ The claim was submitted with four photographs, two showing the damage done to the manager's house and European single quarters - both of which were gutted by fire. Whether this was a wanton act of vandalism, or a fire that got out of control will never be known. However, the fact that the two buildings were 30 m apart would seem to preclude accidental damage, especially when added to the damage to the other buildings. It is worth noting that the original farm building, with its moulded ceilings, forms the core structure to the existing farmhouse on Dwarsfontein and so it would appear that the 1890s farmhouse avoided destruction by Imperial troops during the commando phase of the war. The other two pictures show the assay office and the concentration plant building, both of which suffered structural damage. The dressed stone foundations of the two Blake jaw crushers can be seen in the photograph of the concentration plant building, and they were discussed in the previous chapter.²

Fig. 32 Front cover of the file for war claims damages by the Transvaal Silver Mines Ltd after the Anglo-Boer War.¹



During preliminary archaeological investigations of the site, using the site plans and the four photographs, the concrete foundations for the wooden columns and the remains of

¹ National Archives of South Africa, Pretoria. Depot TAB, Source CJC. Volume No 43, Ref. CJC796 – Claims for Compensation British Subject Transvaal. Pretoria. Transvaal Silver Mines Limited. 1903–1904.

² Transvaal Silver Mines - Report to Directors of Transvaal Silver Mines by H Jennings, (April 1890), Harold Strange Library, Johannesburg Public Library, Johannesburg.

an internal office of the concentration plant building were located. The foundations do correspond with the structural shape of the building in the photograph.

The main focus of the archaeological study was to locate and excavate the manager's house and European single quarter's foundations. The concept was to take historical documents (mine plans) and create a composite plan of the mine buildings of the 1890s and 1920s. The predictive model of the position of the 1890 building foundations was tested using limited excavation techniques and found to be accurate. The possibility for further archaeological research on the Argent site is very strong, with particular reference to the 1890s concentration plant and the single quarters being ideal areas for excavations. During the excavations, samples of low and medium fired bricks were found along with plaster and corrugated iron fragments, all of which confirm the general description of the structures given in Hahn's 1890 manager's report and mentioned in the previous chapter.

The excavated foundations, along with some of the structures as they exist in 2011, appear in Appendix 11. A number of artefacts were recovered and they included a small square clear glass bottle, a glass ink-bottle - recovered from the 1920s boiler house - and sherds of various pieces of 1880s ceramics (tea cups) and a large part of a green glass vessel. Photographs of selected artefacts appear in Appendix 10. The significance of these finds is the link between the historical documents, the plans and the photographs and the descriptive text of the various sources used in this dissertation. A full report of all archaeological activities undertaken was submitted to the South African Heritage Resources Agency (SAHRA).³

It is clear from the annual reports to shareholders that no mining or beneficiation activities took place at the mine between 1895 and 1899. It has to be assumed that during the Anglo-Boer War, 1899–1902, any caretaker that had been present in the period from 1895, abandoned the property, most probably at the outbreak of the war. The file and supporting documents for the claim for war damages provided the only known photographs of buildings of the Transvaal mine from the 1890s period.

³ G Reeks, 'Report on the Historical Archaeology Excavations of the Argent Silver Mine', Unpublished excavation report submitted to South African Heritage Resources Agency (SAHRA).

No records have been found of any Boer commando that may have camped at the mine during the war. A series of questions were supplied by the Transvaal Silver Mines Ltd as part of the supporting documentation for the damages claim. Specific questions were put to a Mr EFW Pohl, who apparently lived on the farm Dwarsfontein up to May 1901, when he surrendered himself to the Irene concentration camp near Pretoria. The questions and Pohl's answers have been inserted, (Fig 29).⁴ The dates are of interest. In question one, Pohl states that he left the farm on 24 May 1901 and then in question two he states that the buildings were all intact when he left. When asked in question three who burnt down the buildings, his reply was the 'Imperial troops on 6 July 1901 under General Campbell.' When asked if anyone was present during the period of destruction the reply was Mrs Cathrina Roets and her children, who also lived on the farm at the time. Pohl also states that the loose timber was used as firewood by Boer commandos and that a C Vermaak carted away two small sheds. From this it appears that the Boer forces did camp at the mine during the war, although Pohl places the blame for damage on the Imperial forces.

Fig. 33 Questions and replies regarding war damage to the buildings and property of Transvaal Silver Mines Ltd as part of the supporting documentation for damages after the Anglo-Boer War.

1. At what date, as nearly as you remember, did you leave the property, during the war, when you went to surrender at Irene

On the 24th May 1901...

2. When you left the Property on that occasion had any damage been done to the various buildings or were they in the same condition as before the war?

The buildings were all intact when I left...

3. Have you any information as to who burnt down the Men's Quarters, Manager's House, Office, and Assay Office, if so, state who, and the approximate date when this occurred?

By the Imperial troops on the 6th July 1901 under Gen Campbell

4. Can you give the name or names of any persons who were present when the buildings were destroyed, if so please give their names and present addresses.

Mrs Cathrina Roets and children, Dwarsfontein

5. Have you any information as to who did any other damage on the property, if so, give particulars and dates?

All the loose timber was used as firewood by Boer commandos, two small sheds (not included) were carted away by C Vermaak (Boer) date not known

6. If you know anything further bearing on the subject kindly give details

I know nothing further of any importance re the subject

Signature *E F W Pohl*

CONCENTRATION
GENERAL REGISTER.
90026

As Pohl was interred by the end of May, it is not clear how he knew about Campbell and Vermaak. It has been established from the records of the Consolidated Gold Fields of South Africa that Mrs Roets lived on the portion of Dwarsfontein on which the

⁴ National Archives of South Africa, Pretoria. Depot TAB, Source CJC. Volume No 43, Ref. CJC796 – Claims for Compensation British Subject Transvaal. Pretoria. Transvaal Silver Mines Limited. 1903–1904.

Number 1 shaft of the Transvaal mine existed. In the Gold Fields files it is named as the 'Roets portion of Dwarsfontein.'



Fig. 35 Mine Manager's House.

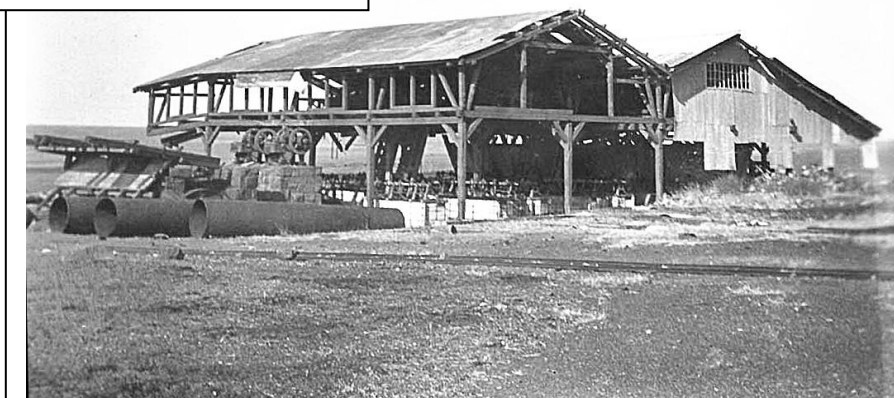


Fig. 34 European miner single quarters.



Fig. 36 Mine assay office.

Fig. 37
Concentration
Plant house (note
the Blake crushers
on top of the
dressed stone
foundations).



Photographs of the destruction caused to buildings at the Transvaal Silver Mines Ltd during the time of the Anglo-Boer War 1899–1902⁵

⁵ National Archives of South Africa, Pretoria. Depot TAB, Source CJC, Volume No. 43, Ref. CJC796 – Claims for Compensation British Subject Transvaal. Pretoria. Transvaal Silver Mines Limited.

Research revealed that there were three British officers named Campbell in the British army in 1901.⁶ Only one was a major general, namely BBD Campbell and his closest reported movements to Argent were in the Standerton area. There was a Major D Campbell, but the only reference to him is in the eastern Free State. Finally there are a number of mentions of a Colonel WP Campbell who commanded the 2nd Battalion Kings Royal Rifle Corps. The conclusion of the research is that it is this Colonel Campbell, possibly mistaken as a general (or he may have been a brevet general), whose troops were at the Transvaal mine, although the evidence is circumstantial. From 3 July 1901 General Sir B Blood was nearing the end of his operations southeast of Pretoria. The British advance was along two fronts, namely the railway lines between Heidelberg and Pretoria and Middelburg and Pretoria. Between 7 and 10 July 1901, Campbell's force advanced placing him in the vicinity of the mine on 6 July – the date in Pohl's statement – thus it seems quite feasible that the British caused the damage to the mine property.⁷ It seems unlikely that affidavits were obtained from either Mrs Roets or the owner of a neighbouring portion of Dwarsfontein - Mrs Le Grange – as such documents were not found in the file. On 4 July 1905 the Military Compensation Board disallowed the claim for financial compensation.

Lionel Phillips, after the Reform Committee trial and subsequent commuting of his death sentence for his role in the plot to overthrow the Kruger government, left South Africa for England. Of the other directors of Transvaal Silver Mines Ltd who were involved in the Reform Committee, nothing is known of their involvement, if any, in the company after 1895. The twelfth AGM of the shareholders was held in July 1905. The chairman, Henry C Boyd, who was also employed by H Eckstein & Co, stated that the cash balance stood at £4 253, with some of the plant machinery having been sold off for £56.⁸ There was still a belief that metal prices would recover to their former levels and that the mine could then re-open as a profitable operation.

⁶ D Palk personal communication, 26 March 2010. Her analysis narrowed the possibilities down and the author chose WP Campbell as the most likely one in the area at the time. Cross-referencing his name with other sources did not confirm or deny him as the most likely Campbell.

⁷ F Maurice, *History of the War in South Africa – Volume 4*, p. 210.

⁸ 'Transvaal Silver Mines', *The South African Mines, Commerce and Industries*, Vol. 3, (5 August 1905), p. 504.

TJ Ball took over the chairmanship of the Transvaal Silver Mines Ltd during 1908. He stated that for some time the directors had been trying to lease out the mine on tribute, and that such a venture had now been entered into for a period of three years with the Transvaal Silver Mines Tribute Syndicate Ltd.⁹ The syndicate appears to have consisted of two men, Sir Aubrey Woolls Sampson and Mr JR Williams - who had been the consulting metallurgist to H Eckstein & Co.¹⁰ Having set up their own battery, the tribute miners ran into serious problems with underground water later in the year.¹¹ The syndicate only operated for about eight months – January to August. During that period they produced 133 tons of ore with a lead content of 62% per ton and containing 151 kg silver.¹² Despite having taken a three-year lease on the old Transvaal Silver Mines Ltd property, the tribute syndicate went into liquidation at the end of 1908.

A second source mentions another company, also in 1908 - Rhenoster Mines Ltd “...sinking a new inclined shaft on the Shimwell Lode [discussed later in this chapter] and continuing the sinking that had been done on the main lode at the Transvaal mine Number 1 shaft.”¹³ This venture was also short-lived especially at the Number 1 shaft. At the prevailing price of lead in 1908, the grades of ore revealed were of insufficient value to be economic and operations at both the Transvaal mine shaft and the Shimwell lode were closed down. Abe Bailey had formed a new company in 1908 to operate the Transvaal mine under tribute. At the time it was stated that the old dumps, which carried profitable values, would be re-worked and it was expected that new shafts were to be sunk on the vein. Although new pumps were installed, the inflow of water proved to be greater than expected and the operation was closed down.¹⁴ No records have been found of the name of the tribute mining company formed by Abe Bailey.

⁹ ‘Transvaal Silver Mines: Let on Tribute’, *The South African Mining Journal*, (14 March 1908), p. 16.

¹⁰ ‘Pretoria Silver, Lead and Copper Mines’, *The South African Mining Journal*, (19 September 1908), p. 801.

¹¹ ‘Transvaal Silver Mines’, *The South African Mining Journal*, (22 August 1908), p. 684.

¹² Council for Geoscience, Pretoria, PH Allport, ‘Lead Production of the Union of South Africa’, Report no. 1940-0070, p. 15.

¹³ Gold Fields of South Africa file ARG820/1/1 GEOL (1) - Argent Project Geology, Volume 1, entry 13, ‘Technical re-appraisal of the Argent lead-zinc deposits’, report by EL Atkinson, Consulting Engineer, 25 October 1973.

¹⁴ ‘Pretoria Silver, Lead and Copper Mines’, *The South African Mining Journal*, (19 September 1908), p. 684.

In December 1909, the shareholders of Transvaal Silver Mines Ltd met to hear the chairman, HC Boyd, tell them how the original tribute syndicate and their successors - such as Rhenoster Mines Ltd - having spent very considerable sums in searching for payable deposits of ore - had terminated their contract. WM Chandler (a geologist) was engaged in 1909 to report on the prospects of the old Transvaal Silver Mines Ltd property. He was also involved with the Transvaal Silver & Lead mine on the farm Roodekrans, west of Pretoria, [this mine is listed in Table 1 but its short history is not discussed in the dissertation]. In his report he stated that no further payable deposits would be discovered in the Argent mines. It is unclear how he was able to determine this without draining the mine and going underground, especially as it is clear from the various reports prior to 1895 that not all of the ore-body exposed in the development of the mine had been mined, a great deal of which was in the rich upper two levels of the mine. Based on Chandler's report it was decided by the Board to recommend that Transvaal Silver Mines Ltd be placed in liquidation. This was carried out early in 1910, thus ending the first major phase in the life of the Transvaal mine under the operating name of the 'Transvaal Silver Mines Ltd' - a period of 21 years, in which 17 tons of silver and 6 000 tons of lead were produced, (see Appendix 3).¹⁵

The Witpoortje Syndicate, which had been closely associated with Transvaal mine through the 1890s, came to an official end in December 1909, when it went into voluntary liquidation.¹⁶ From an operating company point of view, it had probably ceased to exist in the middle of the 1890s. It failed to renew any leases that it had on the farms Brakfontein and Boschpoort, which meant that although the company still existed after the Anglo-Boer War, it had no leased properties to mine.

In the next five years there was a succession of mining syndicates that attempted to mine the various Argent mines. They had very little chance of success, due to the huge cost of keeping water out of the mines - assuming that they were able to dewater the mines in the first place. In 1906, the Brakfontein Silver and Lead Syndicate (Ltd), was formed to dewater the Brakfontein mine. This venture was also unsuccessful and the

¹⁵ 'Trans. Silver Mines: Voluntary Liquidation', *The South African Mining Journal*, (24 December 1909), p. 419.

¹⁶ Registrar of Companies, Pretoria, File 01/00601/06, Witpoortje Syndicate, Registered 14 April 1891.

syndicate was liquidated in January 1907.¹⁷ The leases passed to Boschpoort Silver Mining Syndicate Ltd¹⁸, who dewatered the Brakfontein and Boschpoort mines in August 1907, under the control of consulting engineer Oliver King.¹⁹



Fig. 38 Boschpoort Silver Mining Syndicate share certificate issued to Myer J. Foote who was one of the directors of the syndicate in 1907.²⁰

Directors of the Boschpoort Silver Mining Syndicate are listed as Myer J Foote, J Emrys Evans, RM Connolly, Dr J Schlesinger and Carl Hanau. Only Hanau has been found in biographical sources and his name was mentioned earlier in connection with

¹⁷ Registrar of Companies, Pretoria, File 01/02585/07, Brakfontein Silver and Lead Syndicate (Ltd), Registered on 20 September 1906.

¹⁸ Registrar of Companies, Pretoria, File 01/02655/07, Boschpoort Silver Mining Syndicate Ltd, Registered 28 December 1906.

¹⁹ Gold Fields of South Africa file ARG820/1/1 GEOL. (1) Argent Project Geology, volume 1, entry 1, 'General account of the Base Metal occurrences from Hatherly on the Delagoa Railway, to the Brakpan-Witbank Railway at Argent', report by Oliver King, 20 February 1919, p. 9. See also 'Boschpoort Silver Mine Syndicate', *The South African Mining Journal*, (3 April 1909), p. 110.

²⁰ Boschpoort Silver Mining Syndicate share certificate issued to Myer J Foote, Archive Ref 622 Silver Mining, Harold Strange Library, Johannesburg Public Library, Johannesburg.

Barney Barnato.²¹ Control of the leases and mining operations passed to African Farms Ltd. in 1909, but no further work was carried out on the mines and the leases were allowed to once again lapse.²²

Another new syndicate was formed in 1912 and they reopened the old Transvaal mine, dewatered a portion of it and very soon were mining zinc ore and argentiferous galena. No records of the name of the syndicate have been found and the only references to it appear in *The South African Mining Journal* and the annual report of the Inspector of Mines.²³ In 1914 the Inspector of Mines, TG Trevor, reported that: “Transvaal Silver Mine disposed of 395 tons of lead slime which yielded 79 tons of lead valued at £1 199 and 246.4 kg of fine silver valued at £1 028.”

One wonders why the tribute syndicates kept forming and failing at the old Transvaal mine? It would appear that the potential for high profitable returns from the silver mines kept attracting investors. The major reason for the failures of the tribute syndicates at all four of the Argent mines, which none of them overcame was the massive inflow of water at about 40 m below the surface. Such a problem, even in modern mining, involves huge capital outlays in pumps and piping, but for the relatively small tribute operators of the early twentieth century it was beyond their financial capacity to deal with.²⁴

No details of operational activities were found between 1914 and 1919. The First World War (1914–1918) had a significant impact on the ability to operate mines due to shortages of white mining labour coupled with the reduced demand for silver. It was to be the period of 1919 to 1929 which was to witness the greatest amount of financial and technical re-investment in silver mining in South Africa, and the one in which the largest amount of silver would be recovered from a single silver mine. The early 1920s were to witness the last rebellious attempt by neo-communist leaders of the white

²¹ Gold Fields of South Africa file ARG820/1/1 GEOL. (1) Argent Project Geology, volume 1, entry 1, ‘General account of the Base Metal occurrences from Hatherly on the Delagoa Railway, to the Brakpan-Witbank Railway at Argent’, report by Oliver King, 20 February 1919, p. 9.

²² ‘Trans. Silver Mines’, *The South African Mining Journal*, (16 March 1912), p. 42.

²³ ‘Mining Progress in the Outside Districts’, *The South African Mining Journal*, (3 October 1914), p. 69.

²⁴ *Ibid.*

miner's union to change, not only the control and ownership of the mines, but also the political control within South Africa. The mines of the Argent area were affected by the 1922 miners' strike, and the context behind the strike is discussed in chapter 1.

The old Transvaal mine would be re-named the 'main mine' in 1919 and would be operated as part of the newly formed Transvaal Silver & Base Metal Mines Ltd (hereafter TSBM) when the mining leases were taken over by General Mining. This 'mining house'²⁵ company, which was formed in 1895 by the Randlord gold mining Albu brothers, George and Leopold, was still largely owned and controlled by them in the 1920s. Under the Albu's control, the Argent mines became the biggest silver mining operation this country has ever seen, albeit under the managerial control of General Mining. George Albu was chairman of General Mining.

Shortly after the end of the First World War, prospecting operations were started in the Argent area. In 1919, a 'small operator' under the name of Dwarsfontein Galena produced, or more probably re-worked, the old ore dumps at the Transvaal mine property. They manage to export 739 tons of lead ore at 25% lead and containing 782.25kg of silver.²⁶ This company was operating on Dwarsfontein during the formation of the new silver mining company by General Mining and Finance Corporation Ltd. (hereafter General Mining). Dwarsfontein Galena appears to have been taken over by the new silver mining company in 1920, but as no details of Dwarsfontein Galena have been found in official records, it is possible that it may have been a prospecting/development company or division within General Mining. Certainly the prospecting and exploration rights were acquired and held by one of South Africa's largest mining houses – General Mining. Exactly when they acquired such rights is unclear, but it may have been some time after 1914, when the syndicates either collapsed financially or let the leases lapse. The war years may have precluded any form of prospecting and so the most likely period for any resurgence of activity is from early 1919.

²⁵ The term 'mining house' refers to major companies which operated as group concerns often centralising the technical and managerial operations of the individual mining operations owned and operated by the group. Prime examples of such mining houses are Anglo American, General Mining and Gold Fields.

²⁶ Council for Geoscience, Pretoria, PH Allport, 'Lead Production of the Union of South Africa', Report no 1940-0070, p. 15.

In 1919 General Mining was to dewater all of the old silver mines in the area in an attempt to re-prospect the properties both on surface and underground. These mines included the Transvaal mine property on Dwarsfontein, as well as the old mines on the farms Brakfontein, Boschpoort and Oudezwaanskraal and later other properties of the old Witpoortje Syndicate. New mineralised veins were found on the surface of the farm Dwarsfontein. The company would completely restructure the surface operation at the old mine of Transvaal Silver Mines Ltd, installing a new shaft headgear, a modern (1920s technology) crushing and concentration plant, as well as roasters and smelting equipment. The plant would boast the most modern beneficiation equipment of the time. Approximately 2 km of narrow rail track was eventually laid, connecting the various stages of the plant. Modern housing facilities for both black and white miners were built and a few of the original white management houses still exist, and are currently lived in. During the archaeological pedestrian survey of the Transvaal mine site it became evident that many of the dressed stone foundations of the 1890s buildings had been re-used in the 1920s structures – especially the boiler house, (see photographs in Appendix 11).

In November 1919 it was announced that a new argentiiferous deposit had been discovered on a previously unexploited part of the farm Dwarsfontein. Trenching proved the lode along 243 m of strike and two surface winzes were developed 152 m apart on the lode. In December 1919 a prospectus was published in which the new company, TSBM, with a nominal capital of £70 000, was floated. The chairman of the new company was Sir George Albu.²⁷ The other directors were Arthur French, Errol Hay, George Gooch Hollmes and Comte Francois de Ferries, but no biographical information has been found on any of them. It was stated in the prospectus that TSBM owned the freehold to two portions of the farm Dwarsfontein and prospecting and exploration rights over some 129 square km of properties adjoining the Dwarsfontein farm.

The prospectus further mentioned that considerable work had been done on these farms by the Transvaal Silver Mine Ltd and the Witpoortje Syndicate during the 1889 to 1895

²⁷ Like many of the Randlords, the Albu brothers do not have any specific biography on their lives. This has created some problems when trying to understand the men themselves. In coming across a book on the 100-year history of General Mining – JDF Jones, *Through Fortress and Rock – The Story of Gencor 1895–1995*, the Albus' came alive. A large proportion of the book covered the period when they were in control; sadly though, nothing was written about the silver mining company – Transvaal Silver and Base Metals Ltd.

period. Since that time the mines had remained flooded with short intervals of dewatering. The reasons for closure of the mines in 1895 were given as a severe fall in the market value of the metals in 1894/95. Secondly, the excessive costs prevailing with respect to transport, with the nearest rail connection to the coast in the early 1890s being in Natal and lastly the difficulty, at the time, of dealing with the considerable inflow of water at shallow depths. With the prices of lead and silver being some 150% higher in 1919 than in 1895, transport greatly improved, and water inflows an easily solved problem with improvements in pumping technology, the prospects for the new venture appeared very good and the public's enthusiasm at the flotation was higher than expected. The flotation of TSBM was eleven times over-subscribed with 2 800 individual applications received for the 35 000 shares offered.²⁸

The proposal for re-opening was to dewater the old Transvaal mine on Dwarsfontein and work the large areas of developed, but un-stoped ore, [un-mined ore body] in the upper levels on the No 1 shaft of the old mine. Similarly, although the No 2 shaft had been developed in the 1890s, no stoping had been conducted there and expectations of good ore were high. One of the lodes tested on Dwarsfontein was the Le Grange lode - named after the owner of that portion of the farm. (In chapter 3 Le Grange was named as a co-defendant with Fox in the 'Deep Levels' court case). This lode was traceable on surface for some 1 067 m with a width of up to 2.4 m. The Spies lode (also a new lode) and on a Spies' portion of Dwarsfontein, had a length of 610 m. The Brakfontein lode over 1 219 m, had little or no mineralisation on surface, but had a good lode at about 37 m below surface.

At a meeting of shareholders in April 1920, it was announced that the company had also acquired options on portions of the farms Hekpoort and Witpoort. On the farm Witpoort there were numerous old workings of the Witpoortje Syndicate and these were in the process of being cleared. Acting chairman Mr Arthur French said that ore on the dumps was rich in lead and silver.²⁹ Another lode of considerable interest was the old White Swan mine lode, on the farm Oudezwaanskraal. The prospectus stated that the 1890s

²⁸ 'Transvaal Silver successful flotation', *The S A Mining and Engineering Journal*, (20 December 1919), p. 321.

²⁹ 'The Outlook for Transvaal Silver & Base Metals', *The S A Mining and Engineering Journal*, (24 April 1920), p. 190.

development of Oudezwaanskraal was a mystery, as no plans existed of the mine, yet considerable sinking and development had been carried out and high grades of silver ore were still to be found on the dumps.³⁰ [This farm is listed in Table 1 and the mine operated as the White Swan Argentiferous Co Ltd in the 1890s, but its short history is not discussed in this dissertation].



Fig. 39 Sir George Albu Chairman of General Mining and Finance Corporation.³¹

A report appeared in the press, in July 1920, that drilling and prospecting results were encouraging and that the main shaft of the old Transvaal mine had been dewatered and re-timbered to a depth of 12 m and that as soon as the first level was reached a program of sampling would begin. Dr Heberlein, a well-respected European metallurgist, was retained to consult on the most suitable treatment plant.³² By October 1920, pumping at the main mine's No 1 shaft had dewatered the mine to 43 m, some 5 m below the first level. The old 1st level workings were said to be sound and in the process of being cleared of debris. A new shaft collar and headgear was installed along with pumping equipment and air compressors. On surface, the old dumps were sampled and it was estimated that the gross value of ore contained in them was £108 000. The major portion of the dumps totalled some 30 000 tons of jig residues, assayed at 3.5% lead and 161 g per ton silver.³³

³⁰ 'Important Silver and Base Metal Flotation', *The SA Mining and Engineering Journal*, (29 November 1919), p. 250. See also 'Abridged Prospectus of the Transvaal Silver & Base Metals, Ltd', *The SA Mining and Engineering Journal*, (6 December 1919), p. 250.

³¹ 'Sir George Albu's Review of the Year', *The SA Mining and Engineering Journal*, (25 June 1927), p. 503.

³² 'Progress of the Transvaal Silver & Base Metals', *The SA Mining and Engineering Journal*, (31 July 1920), p. 514.

³³ 'Progress of the Transvaal Silver & Base Metals', *The SA Mining and Engineering Journal*, (30 October 1920), p. 187.

A new No 2 shaft was sunk to replace the old Transvaal mine No 2 shaft and at a depth of 40 m the 1st level was begun. Development of a cross-cut to the lode was then started.³⁴ They continued to sink the shaft and by November 1920 intersected the hanging of the lode at approximately 61 m with the lode dipping at about 80 degrees.³⁵ During the initial phase of development of the TSBM Company Oliver King was the consulting engineer.

Towards the end of 1920 it was announced that a new mining company, Pretoria Silver Lead Co Ltd (hereafter PSL), was to be floated, to mine the 'Shimwell lode'. The consulting engineer advising the company was Oliver King, even though it appears he was still involved in a similar capacity with TSBM. This anomaly has not been resolved. King mentions that WH Furlonge had in fact discussed the lode on Shimwell's portion in a report back in the 1890s.³⁶ In chapter 3, mention was made of a company, PSL, being formed in 1892 with the intention of mining an argentiferous lode 3 km north of the Transvaal Silver Mines Ltd property. No records of any mining by this company have been found and it is assumed that after some prospecting it became a victim of the downturn in the silver mining industry in the greater Pretoria region in the early 1890s due to the collapse of the international silver price.

The initial shipment of ore from the trial diggings was sent to Swansea and gave returns of 50% lead and 1.72 kg per ton silver.³⁷ In the prospectus and background material on PSL, mention is continually made to the fact that King was the consulting engineer who advised on the TSBM deposit and that the share issue for that company had been oversubscribed eleven times. The chairman was Lt-Colonel CL Anderson. The directors were Chas AO Bain, who had been a mining agent in Johannesburg in the 1890s and Andrew Niven, a stockbroker who was also involved in the Reform Committee and after the Anglo-Boer War was involved in local politics in Johannesburg. Four other

³⁴ 'Sir George Albu's Review of the Year', *The S A Mining and Engineering Journal*, (25 June 1927), p. 503.

³⁵ 'Transvaal Silver Improvement', *The SA Mining and Engineering Journal*, (6 November 1920), p. 1.

³⁶ 'Pretoria Silver Lead Company', *The SA Mining and Engineering Journal*, (21 August 1920), p. 624.

³⁷ 'Pretoria Silver-Lead Company', *The SA Mining and Engineering Journal*, (28 August 1920), p. 1.

directors were B Alexander, Jas H Kelley, HJ Hofmeyr and AJ Shimwell,³⁸ but nothing has been found on them in the sources. In December 1920 work began on the construction of buildings and the sinking of the No 1 shaft. W Calder was the general manager.³⁹ Shaft sinking had been held up while the boiler house and winder room were completed and sinking of two winzes was delayed due to flooding.⁴⁰ By the middle of March the boilers were under steam and most of the shaft headgear was completed. Shaft sinking was started in March 1921.⁴¹

The 1st AGM of shareholders of PSL took place under a new chairman, Chas AO Bain, at the end of 1921. Very little of substance was tabled at the meeting, other than that 1125 kg of ore had been removed from the bottom of the winzes and that a trial smelt, which had been carried out in Johannesburg, yielded 404 kg of lead bullion, assaying at 3 kg silver per ton.⁴² By early 1922, the No 2 shaft had been sunk to a depth of 38 m. Water was a major problem in this mine, with an inflow rate, at one time, of 54 000 litres per hour.



Fig. 40 Share option certificate for the Pretoria Silver Lead Co Ltd. September 1921.⁴³

³⁸ It is assumed that Shimwell after whom the lode was named was also the owner of the portion of the Dwarsfontein farm on which the lode was located.

³⁹ 'Progress of the Pretoria Silver and Lead Company', *The SA Mining and Engineering Journal*, (11 December 1920), p. 346.

⁴⁰ 'Pretoria Silver Lead', *The SA Mining and Engineering Journal*, (19 March 1921), p. 841.

⁴¹ 'Pretoria Silver Lead – quarterly report', *The SA Mining and Engineering Journal*, (14 May 1921), p. 1130.

⁴² 'Pretoria Silver Lead – Annual Meeting', *The SA Mining and Engineering Journal*, (17 December 1921), p. 574.

⁴³ Share option certificate - Pretoria Silver Lead Company, original in author's collection.

At the first shareholder's meeting of TSBM in 1921 a detailed report presented by Sir George Albu, the chairman, showed that liabilities in respect of advances made by General Mining were in the region of £88 000. These were due mainly to development and construction costs and were to be covered by the share options scheduled to fall due at the end of January. The prospecting on Witpoort was abandoned because of the great distance from Dwarsfontein and the lack of encouraging results. On Brakfontein it was planned to sink a new 3-compartment shaft to intersect with the old workings at depth.⁴⁴

In his report, the consulting engineer of TSBM, Oliver King, stated that an area of land between the No 1 and No 2 shaft options had been acquired, thus enabling development of the vein between the two shafts. This land formed the Roets' portion of Dwarsfontein. The clearing of the old mine was almost complete and sampling of the 2 128 m of drives, winzes and stope faces had been begun. Surface prospecting of the No 1 shaft lode had proved its existence over a distance of 793 m and at the No 2 shaft of over 610 metres. Between the two proven surface lodes there was an intervening gap of 457 m and it was felt that they connected. Final plans for a reduction and smelting works were prepared and it was estimated that the cost would be in the region of £70 000. The plant was to consist of crushing and sorting equipment, along with concentrators, oil flotation plant, roasting plant and smelter and be capable of producing 500 tons of silver-lead bullion per month.⁴⁵

By early 1921 the main mine had been dewatered to just below the 2nd level and after clearing out debris, the vein was sampled and found to contain lead at 4.8% and silver at 164 g per ton and the ore was stockpiled for treatment. The cut off value to cover expenses was 4% lead and 142 g per ton silver.⁴⁶ Re-sampling of the stopes between the 1st and 2nd levels revealed that there was approximately 50,000 tons of ore remaining in the stopes containing values of 12% lead and 283 g per ton silver.⁴⁷

⁴⁴ 'This Week's Meetings – Transvaal Silver & Base Metals,' *The SA Mining and Engineering Journal*, (1 January 1921), pp. 463-465. This 3 page report presents a huge amount of information about the mine.

⁴⁵ 'Transvaal Silvers: Development & Treatment Schemes', *The SA Mining and Engineering Journal*, (1 January 1921), p. 463.

⁴⁶ 'Transvaal Silver & Base Metals, Ltd', *The SA Mining and Engineering Journal*, (18 September 1920), p. 27.

⁴⁷ 'Progress of Transvaal Silver', *The SA Mining and Engineering Journal*, (12 February 1921), p. 633.

On Brakfontein it had been decided to dewater the mine, enlarge the old shaft to three compartments, and develop a second level at 61 m while extending the development of the 1st level. Development on Boschpoort had been promising with the discovery of rich oxidised ore at a depth of 15 m. It was decided to test the four parallel lodes by sinking winzes either side of the old workings as deep as hand pumping would allow and to drive cross-cuts through the lodes.⁴⁸

A meeting of shareholders was called in April 1921 to approve the raising of capital to £300 000. At the meeting Sir George Albu stated that the initial working capital of the mine had been used in the clearing, dewatering and new developments on the various properties of the company. Loans were advanced by General Mining to purchase new mining and reduction plant equipment. As the main mine was reaching a stage where reduction could soon begin, there was a need to raise fresh working capital prior to the mine becoming a producer. Development of the main mine on Dwarsfontein was continuing with cleaning of the 3rd level and driving of additional winzes between the 2nd and 3rd levels, where blocks of un-stoped ore had been found. The results showed that approximately 124 000 tons of payable ore remained. Albu mentioned that development on Boschpoort was being suspended due to the heavy rains and it would appear that TSBM abandoned its options on the farm. No reasons could be found in any of the sources as to why they abandoned Boschpoort. It is possible that as development of the cross-cut to test the four lodes proceeded, they either did not find sufficient ore or it was of too low a grade to be economic to mine. At the Brakfontein mine, a small steam compressor, hoist and two loco boilers were installed. The shaft was dewatered to 15 m and the shaft re-timbered. A very strong flow of water was encountered at 132 600 litres per hour. Four new winzes were sunk on the lode from surface and ore of good value was discovered.⁴⁹

⁴⁸ 'Progress of Transvaal Silver', *The SA Mining and Engineering Journal*, (12 February 1921), p. 633.

⁴⁹ 'Transvaal Silver & Base Metals – Special Meeting', *The SA Mining and Engineering Journal*, (30 April 1921), p. 1076.

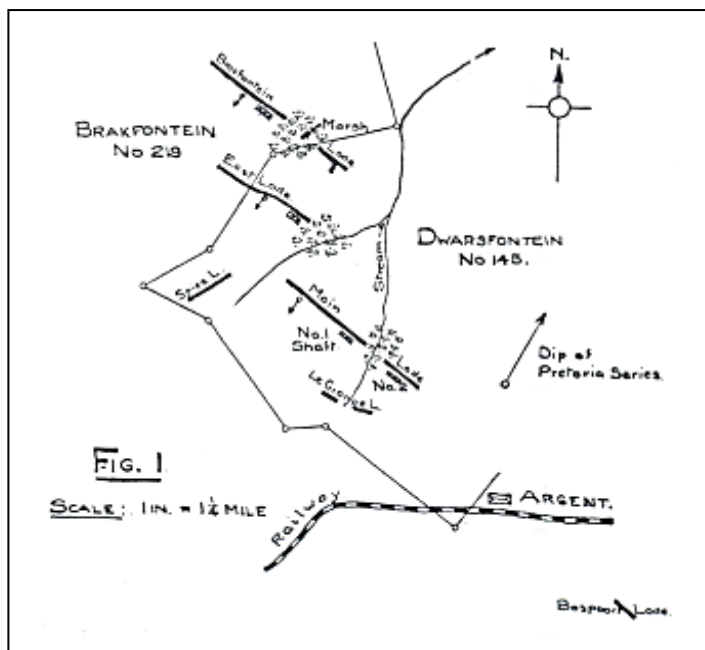


Fig. 41 Sketch plan showing the relationship of the lodes around Transvaal Silver & Base Metals mine.⁵⁰

The SA Mining & Engineering Journal produced a two-part article in June 1921, which presented a substantial amount of information on the TSBM mine and reduction process. It mentions that the grade of mined ore was only 11 % lead and 298 g per ton silver, and that the ore had to be concentrated before smelting. In August 1921, Brakfontein had been dewatered and the lodes exposed. Sampling revealed that the lodes were payable at 12 % lead and 357 g of silver. The old shaft reached a depth of 40 m with the first level at 37 m.

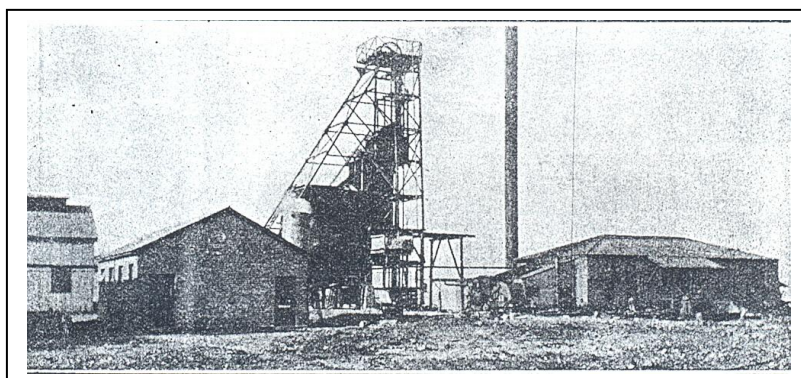
The new roasting plant became operational along with the first unit of the smelter, producing silver-lead bullion in October 1921. Hand-sorted, high grade ore was used in this early operation of the roaster and smelter.⁵¹ Underground developments at the main mine No 1 shaft were very good, with the lode on the 3rd level east opening out to a width of 2.1 m carrying good values. The developments of the drifts on 2nd level No 1 shaft were also improving and the 3rd level of No 2 shaft had opened a lode 2.4 to 3 m wide, also with good values.⁵²

⁵⁰ 'Transvaal Silver & Base Metals, Ltd', *The SA Mining and Engineering Journal*, (11 June 1921), pp. 1271-1273.

⁵¹ 'The Position at the Transvaal Silver Mines', *The SA Mining and Engineering Journal*, (13 October 1921), p. 198.

⁵² 'Transvaal Silver', *The SA Mining and Engineering Journal*, (26 November 1921), p. 454.

Fig. 42 No 1 Shaft at the Transvaal Silver & Base Metals mine 1921.⁵³



By the end of 1921 there had been 2 670 m of development on the main lode in shafts 1 & 2 and 47 m on Brakfontein. The shaft at Brakfontein was also sunk deeper - to 67 m - so that a second level could be developed at the mine. The ore reserves in Brakfontein were estimated at approximately 110 000 tons running at 10.53% lead and 278 g per ton silver.⁵⁴ The plan for the reduction plant on Dwarsfontein was to have a plant capable of handling 4 000 tons per month and this was upgraded to 7 500 tons per month, with the blast furnaces and crushing stations being commissioned by November 1921. The process led to a 95.3 % recovery for lead and 96.6% for silver, very high values for the 1920s.⁵⁵ Development at the beginning of 1922 continued with the shaft being sunk to a depth of 117 m. A double winze had been sunk from the 3rd level and it had reached the depth of the planned 4th level. The lode was intersected at this depth and was still very rich. The development at TSBM was significant for two major reasons. It was the most modern base metal beneficiation plant in South Africa in the 1920s and secondly was to become the largest producer of silver – as the primary product - in South Africa.

The concentration plant was commissioned in January of 1922.⁵⁶ One of the most significant aspects of the reduction plant at TSBM was the groundbreaking technology

⁵³ 'The Reduction & Treatment Plant of the Transvaal Silver and Base Metals' Part 2 *The SA Mining and Engineering Journal*, (28 October 1922), p. 162.

⁵⁴ 'Transvaal Silver & Base Metals, Ltd', *The SA Mining and Engineering Journal*, (17 December 1921), p. 571.

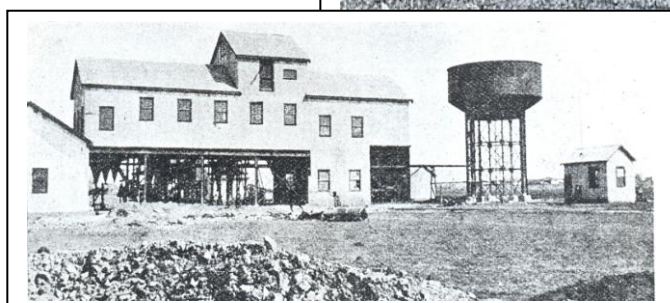
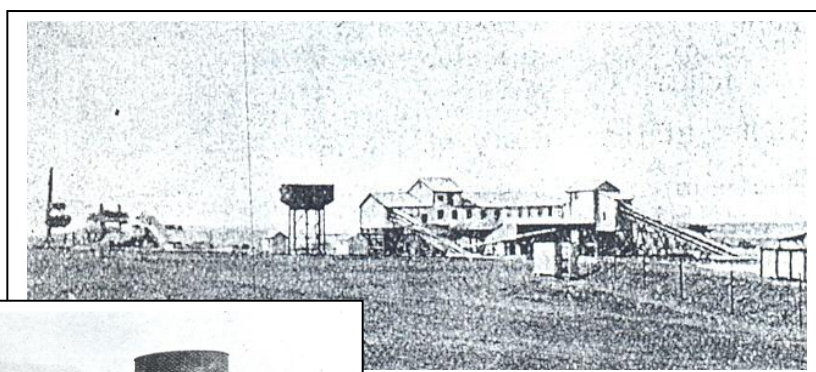
⁵⁵ *Ibid.*

⁵⁶ For a detailed description of the reduction plant and its operation refer to three very good descriptive reports by the consulting mechanical & electrical engineer to TSBM HW Clayden. 'Description of the Reduction Plant erected at the Transvaal Silver & Base Metals, Ltd.' *Journal of the South African Institution of Engineers*, (September 1922), pp. 20-27. See also 'The Reduction & Treatment Plant of the Transvaal Silver and Base Metals, Part 1 & 2' in *The SA Mining and Engineering Journal*, (21 October

installed by its engineers. They were one of the first mines to install ball mills for the crushing and grinding of the mineral particles. They were also one of the first mines on the Witwatersrand to install the process of froth flotation for metallic particle separation as part of the concentration process. This groundbreaking technology in the 1920s is commonplace on modern mines around the world. On Brakfontein the shaft sinking had been stopped at 6.4 m below the 2nd level, while development of a sump was completed on the 1st level. 91 tons of lead bullion, assaying at 98.16% lead and 3.1 kg per ton silver, were smelted from hand-picked ore and shipped to Europe.⁵⁷

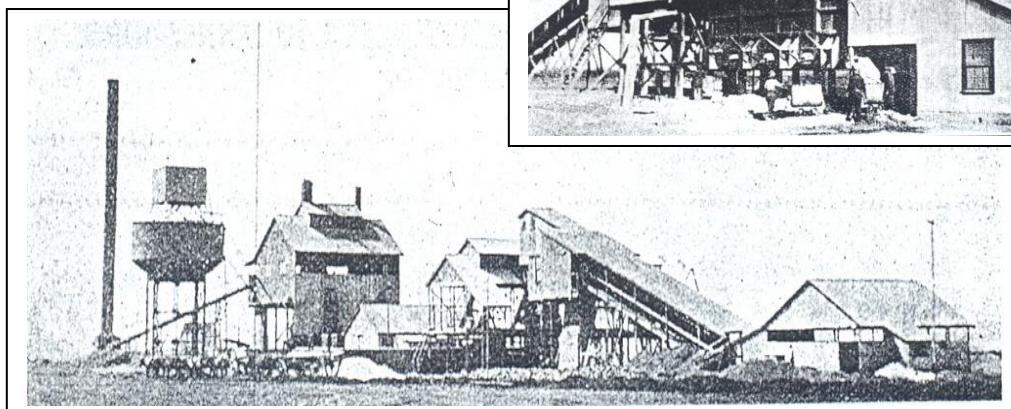
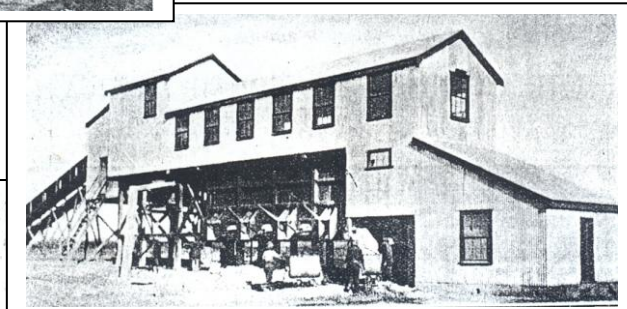
Fig. 43 General view of reduction plant(left) and crushing plant (right).

Fig. 44 Crusher and sorting station.



General views of the Plant at Transvaal Silver & Base Metals in 1921⁵⁸

Fig. 45 Secondary crushing plant.



1922), p. 123 and (28 October 1922), pp. 161-163. (The report included the photographs of the plant reproduced above).

⁵⁷ 'Transvaal Silver Progress Report', *The SA Mining and Engineering Journal*, (28 January 1922), p. 741.

⁵⁸ 'The Reduction & Treatment Plant of the Transvaal Silver and Base Metals, Part 1 & 2' *The SA Mining and Engineering Journal*, (21 October 1922), p. 123 and (28 October 1922), pp. 161-163.

Fig. 46 Concentrating and Smelting plant at the Transvaal Silver & Base Metals mine.

The output of the mine for the first quarter of 1922 was 365.9 tons of lead bullion, containing some 1172.2 kg of silver, or approximately 3.2 kg per ton silver. During 1922 monthly tonnages produced were the main items reported by the newspapers. A new more powerful Robey hoist was installed at the No 1 shaft to enable the hoisting of a greater tonnage. Clearly the development of the mine was proceeding well and the installation of new equipment was seen as part of the development strategy.

Mention has been made of the South African Industrial Federation declaring a general strike and that all daily paid employees of mining companies would cease work from 8 to 20 March 1922. The Miners' Strike was a bitter fight between miners, mine companies and ultimately the Smuts Government. The strike caused a slowdown in the development of TSBM,⁵⁹ where the miners simply walked off the mine without causing structural damage, which occurred on some of the gold mines. Similar strike activity was also experienced at the Pretoria mine.⁶⁰

Despite the strike action, the Pretoria Silver Lead Co Ltd issued £30 000 of debentures in order to raise capital for the development of the stoping areas in the upper levels of the mine. Capital was also required for the development of a reduction and concentrating plant. The shafts and level development had proved the lode over 305 m on surface and in depth the lode had proved to be rich. It was reported that the mine had 700 tons of ore 'at grass', and the plan was to concentrate the silver-lead ore and then ship the concentrate overseas.⁶¹

The development of the stopes, the miners' strike and the commissioning of the reduction plant greatly impacted on the effective production period of the TSBM in 1922. The presiding chairman, Arthur French, raised the concern about the need to lower the developed and payable ore reserve to 65 688 tons from the previous year's figure of 103 000 tons which had been overstated. It was reported that the reduction plant had functioned better than expected during the plant's seven months of full

⁵⁹ 'Transvaal Silvers Progress', *The SA Mining and Engineering Journal*, (29 April 1922), p. 1167.

⁶⁰ 'Pretoria Silver Lead Company', *The SA Mining and Engineering Journal*, (8 April 1922), p. 1072.

⁶¹ 'Pretoria Silver Lead', *The SA Mining and Engineering Journal*, (24 June 1922), p. 1449.

operation until November, and that the financial report for 1922 showed that the company had made a profit of £14 485.⁶²

In the collection of Gold Fields files, one was marked *Argent Project FSJ de Jager's reports*. De Jager had been the field geologist for Gold Fields in the 1950s and was responsible for the reopening of the Argent mines by that company. Most importantly for the reconstruction of the history of the TSBM main mine are his handwritten transcripts of the monthly reports written in the 1920s by the technical advisor to TSBM, [presumed to be Errol Hey rather than the mine manager]. Sadly the original documents no longer exist, neither those of the TSBM or de Jager's transcripts and files, (refer to the comments in 'Sources' covering the Gold Fields Company files – page xx). The technical advisor's reports are written in a brief, technical, 'matter of fact' style as part of the mine reporting system. They also show how, in the 1920s, mining was still largely a 'science of intuition' and the reports reflect the joy and excitement when good values were found and the despair when the lodes declined or disappeared altogether.

The full reports run to about seven pages, but a few significant points have been extracted to demonstrate some of the changes, decisions, problems or developments at the TSBM and Brakfontein mines. The report for February 1923 states that the number 2 shaft of the TSBM mine had been closed down, as the development had failed to prove any economic ore deposits in that part of the mine.⁶³ Around the middle of the year it was being reported that the branch lode was beginning to yield significant values of lead (7.4%) and silver (210 g per ton) over a 76 cm wide lode and that the assay values of the two metals had doubled.⁶⁴ Throughout the year the assays of the Brakfontein ore body were reflecting increases in zinc and as the reduction plant had not been designed for such levels of zinc it was creating problems for the reduction plant

⁶² The Position & Prospects of Transvaal Silvers', *The SA Mining and Engineering Journal*, (30 December 1922), pp. 441-442.

⁶³ Gold Fields of South Africa file ARG820/1/2 LEA-ZIN de JAGER – Argent Project FSJ de Jager's Reports 1989, entry 5, 'A report on the structure and possible remaining economic potential of the main vein - enclosure 3, Extracts from the monthly reports by the Technical Advisor, Jan1923-Oct 1925', 20 April 1989.

⁶⁴ Gold Fields of South Africa file ARG820/1/2 LEA-ZIN de JAGER – Argent Project FSJ de Jager's Reports 1989, entry 5, 'A report on the structure and possible remaining economic potential of the main vein - enclosure 3, Extracts from the monthly reports by the Technical Advisor, Jan1923-Oct 1925', 20 April 1989.

manager.⁶⁵ By December a third level which had been developed at the Brakfontein mine at a depth of 105 m was over 259 m long - unfortunately nearly all of this was in barren ground.⁶⁶

At the end of 1923, Sir George Albu disclosed that the estimated profits for the year were achieved and a net profit of £51 230 was declared. The mine produced 5 424 tons of lead bullion from which 15 380 kg of silver was obtained. The accumulated matte produced by the furnace contained approximately 6% copper, as well as appreciable quantities of lead and silver. However, the mine had had no means of recovering the metals from the matte and it was uneconomic to ship to Europe for treatment.⁶⁷ It was decided to install a set of matte crushing rolls and an annular roasting furnace of the Godfrey type.⁶⁸ The concrete and brick remains of a structure exists at Argent, which has remained a puzzle for several years but which is now believed, after further archive and site research, to be the structural remains of this Godfrey furnace.⁶⁹ After the completion of the furnace, it became possible for the mine to process the matte. The furnace was also used to enrich the matte to 50-55 % copper, at which point it became very viable to ship the matte to Europe for treatment.

There is clear evidence of a lack of interest or willingness by provincial or national government to assist the mining industry in the 1920s. It is seen in decisions not to improve facilities to the TSBM mine, despite the mine indicating the revenue benefits especially to the State Railway operators. The mine was 5 km from the railway station at Argent. The company tried to arrange for the construction of a siding to the main mine, showing that revenue would be generated from the transport of supplies in and bullion out of the mine. The rail authorities declined the request. The Transvaal Province was also approached with requests to maintain the road past the mine. The

⁶⁵ Gold Fields of South Africa file ARG820/1/2 LEA_ZIN de JAGER - Argent Project FSJ de Jager's Reports 1989, entry 4, 'A report on the structure and the economic potential of the Argent Brakfontein lead-zinc-silver vein - annexure 1, Extracts from the monthly reports by the Technical Advisor, Mar 1923-Aug 1924', 20 April 1989.

⁶⁶ *Ibid.*

⁶⁷ Matte is a metallic sulphide mixture containing copper and iron sulphides, produced as a by-product of lead smelting where the ore contains copper

⁶⁸ United States of America – Patent Office Patent no 642,602. J Godfrey & HJ Hayes 'Process of Calcining', February 1900.

⁶⁹ [See photographs in Appendix 11].

company argued that as it was a Provincial Road, the Province should maintain it. The request was similarly turned down.⁷⁰

In reading the old TSBM records mention is made of the "No 2 Freehold", but none of the TSBM records state where such an area was, other than alluding to "adjoining the property of Pretoria Silvers".⁷¹ When the Gold Fields files were copied, one of the documents showed the mine plan of the Shimwell Lode (Fig. 47). It delineates the position of the Freehold area no 2 in relation to the Rhenoster section and the Pretoria mine shaft. The plan shows that it was immediately adjacent to the Pretoria Silver Lead Co Ltd lease area. By 1924 the Shimwell lode had been traced, on surface, for about 800 m.

At the beginning of this chapter it was mentioned that in 1908 a small syndicate, Rhenoster Mines Ltd, sank an inclined shaft on the Shimwell Lode. They carried out a small amount of development work at a depth of 31 m from surface. Various plans and sections of the mine show the Rhenoster section as having a shaft down to the 31 m level and a second shaft called the Transvaal Silver and Base Metals shaft also to a 31 m level - which must date from the 1920s.

The mine plan by Pelletier, dated 1951 (Fig. 47), shows the relationship between the 'Pretoria mine shaft' and the 'Rhenoster section'. Interestingly, the Rhenoster section shows two areas: the TSM and Rhenoster shaft on the 31 m (100 ft) level and a separate area to the northwest marked as TSBM Winze and a 14 m (46 ft) level.

⁷⁰ 'Transvaal Silver & Base Metals', *The SA Mining and Engineering Journal*, (22 December 1923), pp. 362-363.

⁷¹ Gold Fields of South Africa file ARG820/1/2 LEA_ZIN de JAGER - Argent Project FSJ de Jager's Reports 1989, entry 2, 'A report on the geological and economic potential of the Shimwell vein - enclosure 5, Extracts from the monthly reports by the Technical Advisor and the mine manager, Mar 1925-Jul 1925', 20 April 1989.

The 14 m level appears to have been about 50 m long with an equal development northwest and southeast from the bottom of the winze. No records have been found describing this development level.⁷²

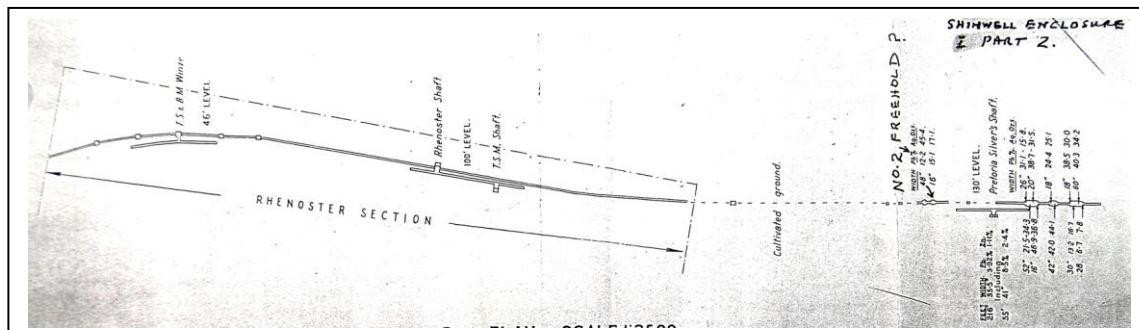


Fig. 47 Sketch of the Shimwell Lode from the Gold Fields Co files.⁷³

What is puzzling is the shaft on the 46 ft level and identified as the ‘TSM shaft’. No records exist indicating that the Transvaal Silver Mines Ltd (TSM) of the 1890s developed a shaft on the Shimwell lode. It has to be assumed that it was a drafting error and should read ‘TSBM shaft’.

By reading the technical reports of 1924, it appears to have been the year in which ‘doom took hold’. Suddenly there are comments with such phrases as “barren lode”, “nothing further being discovered” and “closing down.” With such negative comments the suspension of all operations was becoming a reality.⁷⁴ Did the management really explore all possibilities for further deposits or even alternative sources of ore from other mines in the district? TSBM had leases on many of the farms in the district and the mine

⁷² Gold Fields of South Africa file ARG820/1/1 GEOL (1) - Argent Project Geology, volume 1, entry 8, ‘Argent lead-silver-zinc deposits’, report by RA Pelletier, Consulting Geologist, 14 September 1951, p. 11. See also Gold Fields of South Africa file ARG820/1/2 LEA_ZIN de JAGER - Argent Project FSJ de Jager’s Reports 1989, entry 2, ‘A report on the geological and economic potential of the Shimwell vein - enclosure 5, Extracts from the monthly reports by the Technical Advisor and the mine manager, Mar 1925-Jul 1925’, 20 April 1989.

⁷³ Gold Fields of South Africa file ARG820/1/2 LEA_ZIN de JAGER - Argent Project FSJ de Jager’s Reports 1989, entry 2, ‘A report on the geological and economic potential of the Shimwell vein - enclosure 5, Extracts from the monthly reports by the Technical Advisor and the mine manager, Mar 1925-Jul 1925’, 20 April 1989.

⁷⁴ Gold Fields of South Africa file ARG820/1/2 LEA_ZIN de JAGER - Argent Project FSJ de Jager’s Reports 1989, entry 4, ‘A report on the structure and the economic potential of the Argent Brakfontein lead-zinc-silver vein - annexure 1, Extracts from the monthly reports by the Technical Advisor, Mar 1923-Aug 1924’, 20 April 1989. See Also ‘Transvaal Silver & Base Metal’, *The SA Mining and Engineering Journal*, (22 December 1923), pp. 362-363.

that could have kept the reduction plant in operation, and therefore TSBM for several more years, would have been the Pretoria mine – also on Dwarsfontein.

Dr Percy Wagner, the famous South African geologist, visited the Transvaal mine at Argent in 1924 going to both the No 1 & 2 shafts. He reported that the lodes on the mines consisted of both rich and barren patches of ore. The No 2 shaft had gone through the rich patches and looked as if all that was left were barren sections. On the No 1 shaft (main mine) he recommended that development on 5th level southeast be stopped and that development on 7th level east and west be continued to prove the lode. His comments on Brakfontein and the Pretoria mine were not favourable and in his opinion the richest areas had probably been mined out. Wagner's detailed analysis of the mineralogy of the mine appeared in a paper by him in 1924.⁷⁵ By the middle of 1924, development at the Brakfontein mine ceased and by August management decided that all economic ore bodies had been mined out and the mine was abandoned and allowed to flood.⁷⁶

The 5th AGM of the company, held at the end of 1924, was a gloomy one for the shareholders. Sir George Albu, the chairman, began by saying that a net profit of £92 555 had been made in the year and that financially the company was very liquid and 4 719 tons of lead bullion had been produced yielding 15 292.6 kg of silver. He stated that the tonnage treated was less than the previous year, which led to a slight increase in production costs, but fortunately this was covered by an increase in the price of lead.⁷⁷ The 7th level had also shown un-payable lode and an incline shaft had been sunk to the plane of the 8th level, but the lode had proved to be barren and narrowing out. The decision was therefore made to suspend shaft sinking at 230 m and there was no development of a 6th or 7th level. However, a decision was made to sink an inclined shaft from the main shaft at the depth of a 7th level and it was driven down to the equivalent of the 8th level or approximately 250 m, to determine if any payable lode

⁷⁵ PA Wagner, 'A Transvaal Silver-lead Deposit', *Economic Geologist*, Vol. 14, (1924). pp. 651-667. See also Council for Geoscience, Pretoria, PA Wagner, 'Lead and Silver', Report No 1924-0005, 1924.

⁷⁶ Gold Fields of South Africa file ARG820/1/2 LEA-ZIN de JAGER - Argent Project FSJ de Jager's Reports 1989, entry 5, 'A report on the structure and possible remaining economic potential of the main vein - enclosure 3, Extracts from the monthly reports by the Technical Advisor, Jan1923-Oct 1925', 20 April 1989.

⁷⁷ 'The Outlook for Transvaal Silver', *The SA Mining and Engineering Journal*, (20 December 1924), pp. 415-416.

existed at that depth.⁷⁸ The June 1924 monthly report stated “...the incline attained [a] depth of the 8th level, and in view of the fact that the lode (which at this plane is in red granite) [actually red quartz syenite] had pinched and was entirely barren, and also since the borehole put down to the plane of the 9th level had shown equally unsatisfactory results, it was decided, reluctantly, to suspend sinking operations forthwith.”⁷⁹

After a brief closure of two weeks for modifications to be made, the smelter was once again operational in February 1925. The modifications allowed for the treatment of the copper rich matte and during February 42.6 tons of lead bullion and 95.5 tons of copper were produced.⁸⁰ The exact amounts of silver produced from the bullion and copper were not disclosed. The treatment of all remaining stocks of ore, concentrates, by-products and flue dust was completed by the end of September 1925. The brickwork and crucible of the 2x1 m rectangular furnace was demolished, with the metal bearing materials being smelted in a 1 metre circular furnace. After this, the crucible was broken up and the metal rich parts were sent to the Witwatersrand Co-operative Smelting Works for treatment. By October all clean-up work had been completed and the plant was closed down and put in the hands of a caretaker.⁸¹

One of the mysteries of the 1920s investments in silver-lead deposits was why TSBM did not take out prospecting rights or options on the portion of Dwarsfontein known as Shimwell’s portion. More correctly, why were they not forthright enough to convince the owner AJ Shimwell to option the farm portion to them in 1919 or 1920. Had they done so they would clearly have had a good vein close to the Transvaal mine. Shimwell had been prospecting on his portion of Dwarsfontein and had exposed a portion of the vein. The source states that from January to April 1920, he produced 22 tons of lead with a content

⁷⁸ Gold Fields of South Africa file ARG820/1/2 LEA-ZIN de JAGER - Argent Project FSJ de Jager’s Reports 1989, entry 5, ‘A report on the structure and possible remaining economic potential of the main vein - enclosure 3, Extracts from the monthly reports by the Technical Advisor, Jan1923-Oct 1925’, 20 April 1989.

⁷⁹ Gold Fields of South Africa file ARG820/1/2 LEA-ZIN de JAGER - Argent Project FSJ de Jager’s Reports 1989, entry 5, ‘A report on the structure and possible remaining economic potential of the main vein - enclosure 3, Extracts from the monthly reports by the Technical Advisor, Jan1923-Oct 1925’, 20 April 1989.

⁸⁰ ‘Transvaal Silver & Base Metals’, *The SA Mining and Engineering Journal*, (7 February 1925), p. 583.

⁸¹ ‘Transvaal Silver & Base Metals, quarterly report’, *The SA Mining and Engineering Journal*, (14 November 1925), p. 309.

of 25 kg of silver.⁸² The technical advisor's reports in the Gold Fields files show that it was only in 1925 that TSBM actively conducted any development and mining on the Shimwell vein, this being on the old Rhenoster mine and Freehold no 2 portions of the vein.

The Gold Fields files and the technical advisor's monthly status reports provided development and production details found in no other source. As with the Transvaal mine and the Brakfontein mine, the Shimwell vein reports have been edited and the following facts extracted. In March 1925 it was reported that trenching had begun on the No 2 Freehold property next to the Pretoria mine and that the result was encouraging. The work was carried out by 16 black workers under the direction of one white miner. From April to July a total of 593 tons of ore was mined assaying averages of lead at 7.5% and silver at 132 g per ton and it had been transported to the TSBM reduction works. In the July report it was stated that "...as all available ore had been mined at this point the operation was suspended."⁸³

In July 1926 the first mention is made of the Board of TSBM considering the possibility of placing the company in voluntary liquidation.⁸⁴ In October the assets, the freehold land, mineral rights, machinery and buildings, on the farm Dwarsfontein and the timber plantation on the farm Rondevlei were put up for sale. There was no mention of the other farms that they had prospected, such as Oudezwaanskraal, Boschkop, Boschpoort or Brakfontein. It is possible that the company had disposed of the rights to them before the final liquidation.

A meeting of shareholders was called at the end of 1926 to adopt a resolution to place the company in liquidation. The chairman mentioned that the assets of the company had been put up for sale on a tender basis. The offers were far below what was expected and they were all refused. General Mining had then made a single offer of £14 000 for all of

⁸² Council for Geoscience, Pretoria, PH Allport, 'Lead Production of the Union of South Africa', Report no. 1940-0070, 1940, p. 15.

⁸³ Gold Fields of South Africa file ARG820/1/2 LEA_ZIN de JAGER - Argent Project FSJ de Jager's Reports 1989, entry 2, 'A report on the geological and economic potential of the Shimwell vein - enclosure 5, Extracts from the monthly reports by the Technical Advisor and the mine manager, Mar 1925-Jul 1925', 20 April 1989.

⁸⁴ 'Transvaal Silver & Base Metals, Ltd', *The S A Mining and Engineering Journal*, (14 July 1926), p. 475.

the assets, which was accepted. Was this offer in the best interests of the shareholders, or of General Mining who purchased an almost new beneficiation plant at a ‘bargain basement’ price? It is unknown how many of the shares of TSBM were owned by General Mining, but clearly with joint management structures it was easy for such a sale to go through without reference to any external shareholders. With the realisation of its assets, the shareholders could expect to receive a distribution of half a guinea (10s 6d) per share.⁸⁵ The company was officially placed in liquidation on the 8 December 1926, with final liquidation occurring in July 1927.⁸⁶

Virtually nothing was published on the Pretoria Silver Lead Co Ltd from July 1922 to December 1924. During this period, the company had run into serious operating financial problems and the mine appears to have been closed down and probably put onto a ‘care & maintenance basis’ (see Appendix 1 for explanation of the term). The greatest problem was a lack of cash resources to install the necessary crushing and concentrating plant. The company management expected to close a deal, worth £50 000, with a third party in England, but the deal was not concluded for reasons unknown.

The irony of the situation was that the TSBM Company was running out of ore at the Transvaal mine and its reduction works was being put in jeopardy. The PSL mine had ore, but no cash resources to process the ore. Why, one asks, could they not help each other with the Pretoria mine selling its ore for treatment by TSBM? Although they were separate companies with no ‘Head Office’ links, the situation - with hindsight - seems bizarre. Within the following year, both operations were closed down on Dwarsfontein and both companies were liquidated. If the two companies had made some form of joint operation it could have extended their lives possibly by up to two years.

In the case of Pretoria Silver Lead Ltd, the name was changed in 1926 to the New Pretoria Silver Lead Mines Ltd; the reason for the change is unknown. The company began prospecting operations on the farm Rhenosterhoekspruit in the Waterberg District

⁸⁵ ‘Transvaal Silver & Base Metals, Ltd’, *The S A Mining and Engineering Journal*, (27 November 1926), p. 341. See also ‘Transvaal Silver & Base Metals, Ltd. Circular to Shareholders re liquidation’, (10 December 1926).

⁸⁶ Registrar of Companies, Pretoria, File 01/06172/06, Transvaal Silver & Base Metals Ltd, Registered 24 November 1919.

where tin and bismuth deposits were discovered.⁸⁷ At the same time they retained an interest in the Pretoria mine on Dwarsfontein and in April 1927 Mr James Ennis, a prospector, was employed to continue prospecting at the mine and he apparently discovered some new pockets of ore, most probably on the surface.⁸⁸

Exactly what happened at the Pretoria mine has been very difficult to interpret. If the company was forced to close down its Dwarsfontein operation due to an inability to raise operating capital, how were they able to continue mining tin and bismuth in the Waterberg? In 1929 prospecting work was discontinued at the Pretoria mine on Dwarsfontein due to the major drop in the price of lead from £43 to £20 per ton. It was shortly after this announcement that the company stopped all operations and was liquidated.

During its brief productive life from April 1922 to October 1925, Transvaal Silver and Base Metals Ltd (TSBM), milled 169 012 tons from the Transvaal mine, at a mill grade of over 7% lead. The Brakfontein mine contributed an additional 14 398 tons of ore and the Shimwell vein from shallow trenching and mining 1 883 tons. A further 1 517 tons was acquired from the dumps of the old Transvaal Silver Mines Ltd. The total operation produced 16 967 tons of lead and 44 577 kg of silver.⁸⁹ There was also production of 177 tons of copper along with an unknown amount of gold, all of which yielded a profit of £227 630 over the period mentioned.

From 1929 the mines of Argent returned to virtual obscurity until 1940. There were two reasons for this lack of activity on the mines. Firstly from 1928 the world went into a severe economic recession which lasted through the 1930s and secondly the international price of silver had remained low through the 1930s and this was not helped by the price of lead which fell in value during the period 1928–1932. In 1940 four geologists of the SA Geological Survey, LE Kent, HD Russell, JF Enslin and J Willemse, carried out both a geophysical survey and mineralogical study at the four mines of Argent. In 1940, a report was written by Kent, describing the old Pretoria mine

⁸⁷ 'Bismuth in the Transvaal', *The SA Mining and Engineering Journal*, (23 April 1927), p. 205.

⁸⁸ 'New Pretoria Silver Lead Company', *The SA Mining and Engineering Journal*, (23 April 1927), p. 205.

⁸⁹ Council for Geoscience, Pretoria, PH Allport, 'Lead Production of the Union of South Africa', Report no. 1940-0070, 1940, p. 15.

workings. In a further report by Russell in 1941, he comments that the average value of the Shimwell lode (Pretoria mine) as "...approx 4% lead and 102 g per ton silver with estimated ore reserves in the southeast portion of the vein of 6 000 short tons of lead and approximately 15 309 kg of silver."⁹⁰ As neither of the mining companies pursued the underground development of this deposit one has to question the estimated values of the deposit in Russell's report especially considering that a deposit of this nature would have extended the life of either mine by several years.

In searching the files of the Registrar of Companies in Pretoria, a new company name appeared in connection with the farm Dwarsfontein - Transvaal Galena (Pty) Ltd. They reopened the old TSBM Transvaal mine in June 1940, but no records have been found on their mining operation, other than the names of the two directors, Ludwig Wipplinger and Isadore Greenberg (no biographical information has been found in the sources). It can only be assumed that if any ore or concentrates were produced, it was by reworking the dumps. The company was liquidated in March 1947.⁹¹

At the beginning of 1949 the deposits at Argent (Transvaal mine, Pretoria mine, Brakfontein mine and the Boschpoort mine) came to the attention of DT Hudson, a mining engineer. It is possible he was a speculator in potential mining ventures as he secured various forms of title on the deposits, but realising that he did not have the resources to work the deposits he approached Consolidated Gold Fields of South Africa Ltd. The leases were transferred to Gold Fields and the Brakfontein mine was the first to be dewatered. This began in late 1949 and they discovered the three levels in the mine were still in reasonable condition and accessible. The 38 m level was 366 m long; the 69 m level 397 m long and the 99 m level, 247 m long.⁹²

⁹⁰ Council for Geoscience, Pretoria, LE Kent, 'Report on the Dwarsfontein Lead Mine (Old Pretoria Silver Mines)', Report No 1940-0092, 1940. See also JF Enslin, 'Report on Geophysical Survey at Dwarsfontein 21', Report No 1941-0043, 1940. See also HD Russell, 'The Argent Lead-Silver veins S.E. Pretoria, N.E. Springs', Report No 1941-0044, 1940.

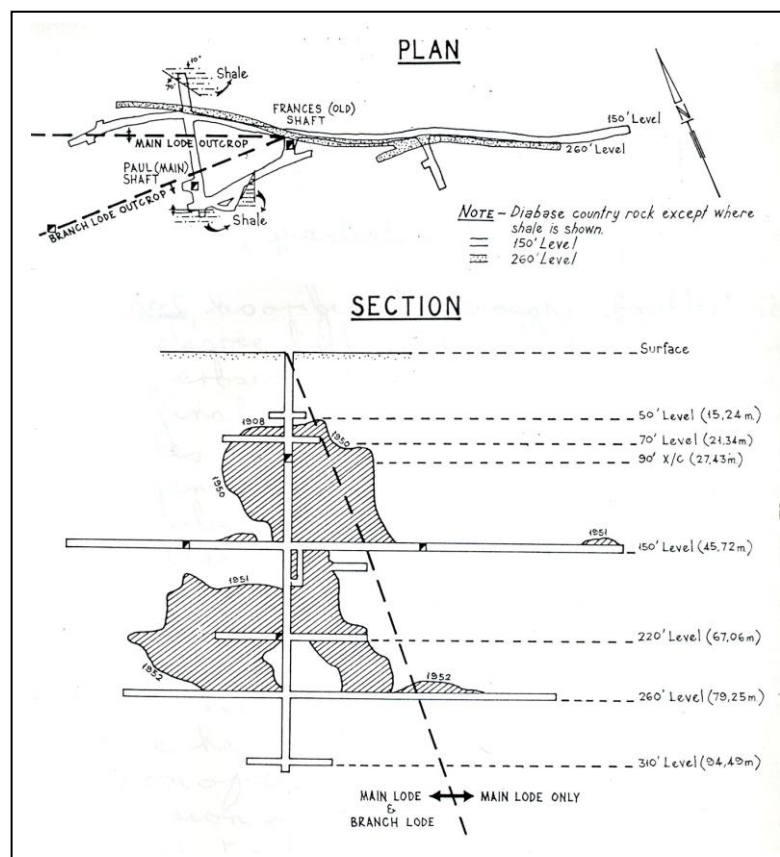
⁹¹ Registrar of Companies, Pretoria, File 05/14011/06, Transvaal Galena (Pty) Ltd, Registered 25 June 1940.

⁹² Gold Fields of South Africa file ARG820/1/1 GEOL (1) - Argent Project Geology, Volume 1, entry 6, 'Notes on the Argent lead-silver-zinc deposits', report by RA Pelletier, Consulting Geologist, 26 May 1950, p. 2.

The Registrar of Companies has on record a company or syndicate named Boschpoort Lead Mine Ltd, which was registered in November 1951.⁹³ The directors are listed as Tom Edwards, John Douglas Wilson and later Thomas D Curry and Cornelius C Schoombie. Once again no biographical details have been found on any of these men. In 1950, the Boschpoort mine was dewatered, and the Frances shaft was deepened to 94 m. Additional development and stoping was continued on the No 3 lode until 1952, with lead ore in the form of a lead carbonate being found in a shaft 16 m deep some 300 m to the northwest of the main shaft in the upper levels. This shallow shaft is named Paul on the plan (Fig 48). It is not clear why this was designated the 'main shaft,' especially as the other shaft was deeper. The Paul shaft was sunk on what appeared to have been an extension of the No 3 Lode. No details of how much ore was mined have been found. The Boschpoort Lead Mine Company was liquidated in November 1954.

Fig. 48 Boschpoort Lead Mine Ltd, underground plan, c1952.⁹⁴

The period from the 1950s to 1970s was the third and final period when a major mining group – in this instance the New Consolidated Gold Fields – took an interest in the Pretoria southeast area, especially



the Argent mines. It was a period when prospecting and mining activity took place intermittently – still under the influence of international lead and silver prices.

⁹³ Registrar of Companies, Pretoria, File 51/03864/07, Boschpoort Lead Mine, Registered 15 November 1951.

⁹⁴ Gold Fields of South Africa file ARG820/1/1 BOSPGEN - Boschpoort 211 IR, 'Argent Project Boschpoort 211 IR, District Delmas', entry 4, general report and plans by D Campbell, Chief Geologist, 12 December 1975.

During the 1950s – the mines were again dewatered and their values reassessed. A consortium company with New Consolidated Gold Fields (as the major partner at 33.5%),⁹⁵ Anglo American Corporation of South Africa Ltd and General Mining (each holding 33.25%) was registered as Argent Lead and Zinc Ltd (ALZ) in June 1952, and this became the new operating company for the Argent mines.⁹⁶ In one case – the Brakfontein deposit – ALZ developed and mined ore until the fall of the international price of lead and zinc would again force the closure of the mines in 1957.

An interim report was written by RA Pelletier (Gold Fields consulting geologist in the early 1950s) in May 1950 stating that the sampling of the Brakfontein mine had shown that there was still approximately 61 000 tons of mineable ore in the developed part of the mine, averaging 5.2 % lead and 4.9% zinc, with silver at 142 g per ton.⁹⁷

The Transvaal mine on Dwarsfontein was dewatered in the latter half of 1950 and was sampled by FSJ de Jager, a senior field geologist working for Gold Fields, and his estimates were of 67 000 tons of ore averaging 6% lead with silver running at 1% per percent lead, and with virtually no zinc.⁹⁸ During the same period, the workings at Brakfontein were allowed to re-flood. It was then discovered that the samples taken from the mine contained a high proportion of zinc (49%) mixed with the lead. It is possible that had they not allowed the mine to re-flood, they may well have started mining it again on the strength of the zinc values present in the ore body.

In 1951 Gold Fields dewatered the Transvaal mine number 1 and number 2 shafts on Dwarsfontein and started an extensive sampling program. The price of lead had risen to such an extent that the un-worked and formerly un-payable areas of the old TSBM mine had become viable. The reserves at the No 1 shaft were estimated at 49 000 tons with a lead value of 4.9%, and at the No 2 shaft reserves of 18 000 tons at 7.5%. The workings

⁹⁵ Gold Fields as a company has changed its name several times since its formation in 1897.

⁹⁶ Gold Fields of South Africa file ARG820/1/1 GEOL. (1) Argent Project Geology, Volume 1, entry 13, Annexure C in 'Technical re-appraisal of the Argent Lead Zinc Deposits', 25 October 1973.

⁹⁷ *Ibid.*, p. 4.

⁹⁸ Gold Fields of South Africa file ARG820/1/1 GEOL (1) - Argent Project Geology, Volume 1, entry 8, 'Argent lead-silver-zinc deposits', report by RA Pelletier, Consulting Geologist, 14 September 1951.

of the old Pretoria mine were also dewatered by Gold Fields in 1951 and the single level at 46 m was sampled over its length of 61 m.

In his final report on the Argent prospects in August 1951, Pelletier recommended that the old mines of the area, especially Brakfontein and the Transvaal mine on Dwarsfontein be brought back into production. According to Pelletier the ore reserves of the Brakfontein mine had been recalculated to 91 000 tons averaging 4% lead and 3.8% zinc with silver running at 1% per percent of lead and 0.33 % per percent zinc. He felt that they had an expected life of at least 5 years and that this might well be extended to ten years. His main reasons were that Brakfontein had only been developed to a 3rd level and that on the sample results of the levels there were still considerable tonnages of ore in the three levels. This was coupled with the potential for further payable ore being developed down to a 5th level; and extension of the drives could also expose other bodies. Although a 5th level was developed a 4th level was omitted for some reason, which cannot be explained.⁹⁹

The lode was very wide and generally consisted of two parallel ore bodies, but it had not been developed to its full width. Most of the development and mining had been on the footwall ore body and the hanging wall ore body had been left intact. It now seems that the hanging wall lode was undetected in the original 1890s or 1920s mining operations. A sketch (Fig 49) illustrates the differences between the two types of lode. On the Transvaal mine, Pelletier felt that although the full payable depth had been reached, there were areas of the mine that had not been exploited and a reasonable

tonnage was still available in the previously developed areas of the mine.

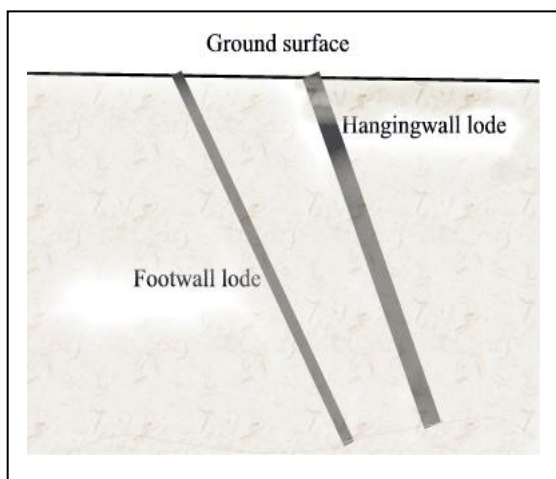


Fig. 49 Sketch showing both a footwall and a hanging wall lode - they may run parallel to each other. The footwall is the wall of rock under a vein, and the hanging wall is that which is above the vein. Thus a footwall lode is that which is below the hanging wall lode as illustrated in the sketch.

⁹⁹ Gold Fields of South Africa file ARG820/1/1 GEOL (1) - Argent Project Geology, Volume 1, entry 8, 'Argent lead-silver-zinc deposits', report by RA Pelletier, Consulting Geologist, 14 September 1951.

In June 1953 the international prices of lead and zinc fell dramatically and all construction work on Brakfontein slowed down. By June 1954 the prices of lead and zinc had started to climb again, but not sufficiently to re-open the mine. As was stated in the first chapter, silver in South Africa occurs as a component part of lead, copper or zinc ores but not always at economically high enough grades. If the international price of the base metals is too low to mine them then the silver is not recovered either. All construction work was stopped and the property put on a care and maintenance basis. In August 1955 when the prices had risen sufficiently, construction work was resumed and the mine was put into production.¹⁰⁰

The annual reports of Gold Fields, summaries of which appeared in the *SA Mining & Engineering Journal* for 1952, 1953 and 1954, all read more or less the same such as: “The [Argent] property has been equipped and can be put into production upon the return of more stable conditions in the market for metals”.¹⁰¹ Development of the Brakfontein mine was restarted in April 1956 and mining of the lode was started in July 1956. Stopping operations continued for a year and were stopped in August 1957. An extensive report on the costs and potential profits of mining the various deposits was written by the consulting engineer of Gold Fields at the end of 1957, shortly after the closure of mining operations on Brakfontein.¹⁰² The mine closed in October 1957, when dropping metal prices again made the mining operation uneconomic. The actual recovery values for lead were also below what had originally been calculated and so viability became an issue. The 4% of Pelletier’s report was in fact closer to 2.5% lead, although the zinc recovery was slightly higher at 4.6%.

During the 1950s period of mining, some 700 m of lateral underground development was carried out on the Brakfontein lode. Production took place on Brakfontein mine for a period of 13 months and yielded an average of 4% lead and 5% zinc with 151 g per ton silver. These values would total 59 800 tons of ore yielding 2 392 tons of lead and 2 990

¹⁰⁰ Gold Fields of South Africa file ARG820/1/1 GEOL (1) - Argent Project Geology, Volume 1, entry 8, ‘Argent lead-silver-zinc deposits’, report by RA Pelletier, Consulting Geologist, 14 September 1951.

¹⁰¹ ‘The Consolidated Gold Fields of South Africa Ltd’, *The SA Mining and Engineering Journal*, (20 December 1952), p. 687. See also *Ibid.*, (19 December 1953), p. 617. See also *Ibid.*, (18 December 1954), p. 699.

¹⁰² Gold Fields of South Africa file ARG820/1/1 BRAK – Argent Project Brakfontein, entry 18, ‘A Review of the main factors concerning the opening up of the mine, the operating results obtained and the effects of metal price variations’, report by LD Browne, Consulting Engineer, 10 December 1957.

tons of zinc concentrates with a silver content of 361 kg. The silver content is calculated solely on the lead value of 2 392 tons. It is more than likely that the zinc sulphide (sphalerite) would also contain a percentage of silver and in fact Campbell in his 1977 report (see below) stated that it did, but did not give a value or percentage. Surface prospecting of the vein to the north of the mine workings was carried out, but no evidence of further mineralisation could be found. Two lines of overlapping holes were also drilled on the projected extension of the vein but once again no significant mineralisation was intersected.

The impending expansion of the Zincor Ltd smelter at Springs in the early 1970s created a reassessment of the potential of the Argent deposits for zinc and this began in 1973. The substantial increase in the international prices of base metals (lead and zinc with silver as a by-product) during this period led to a renewed interest in the mines. Gold Fields, as main partner in the Argent Lead and Zinc Co Ltd consortium, took out a number of options on farms in the area and carried out an extensive drilling and geochemical prospecting operation, which was concluded in 1977. The reports indicated that the reserves were too small, and the values too low, to be of interest. In 1977 a final report on the Boschpoort deposit concluded that the results of the geochemical and drilling program on the farm had failed to reveal any mineralisation of significant quantity or quality and that it was recommended that the option should not be renewed.¹⁰³

In the final report on the Argent Project in 1977, D Campbell, the group geologist for Gold Fields, stated that although surface prospecting had been conducted to the southeast of the Brakfontein mine, the full potential of the lode should be investigated as it could contain 2.1 million tons of ore based on a strike length of 2 000 m x 200 m depth x 1.5 m width at a grade of 4.4% zinc 2.9% lead and 93 g per ton silver.¹⁰⁴ If this was so, why was it not pursued and confirmed by drilling in the 1970s? The simple answer is we will probably never know, as mining at the Brakfontein mine was over.

¹⁰³ Gold Fields of South Africa file ARG820/1/1 GEOL (1) - Argent Project Geology, Volume 1, entry 17, 'The Argent project – Final report', report by D Campbell, Group Geologist, 15 March 1977, p. 13.

¹⁰⁴ *Ibid.*, p. 11.

After dewatering the old Pretoria mine (Shimwell lode) once again in the 1970s, 670 m of sampling and development was conducted at the 46 m level. The samples averaged 4.5% lead and 1% zinc. In the final report on the Shimwell lode it was reported that the mineralisation was predominantly galena in siderite fillings. Approximately 670 m were sampled, of which only 204 m yielded a payable grade of 4.3% lead and 1% zinc over a stopping width of 1.46 m. It was concluded that as the combined metal content of the Shimwell Lode was lower than that at Brakfontein, it was not a very attractive target for further prospecting and development.¹⁰⁵

The final report by Campbell in 1978, dealing with all of the Argent mines under lease to the consortium, concludes with the statement: “Since there is very little chance of finding supplementary ore in the vicinity, it is concluded that the potential of the area held by Argent Lead and Zinc Co Ltd may be too small to support a viable mine.”¹⁰⁶ Shortly after this statement all interest in the Argent mines area by the Gold Fields consortium was brought to a close although Gold Fields, through ALZ, kept the lease on the mining rights at Brakfontein.

A final flicker of interest in 1999 would be the last in the silver mining industry of the greater Pretoria region. In January 1999 it was announced that a mining company, OTR Mining Ltd, had purchased Argent Lead and Zinc from a consortium led by Gold Fields of South Africa. Gardner [managing director] said he had signed a deal to deliver zinc from Argent to a ‘major company’. He stated “this would earn OTR R90 million over the next 10 months at a cost of R17 million.”¹⁰⁷ Where such values came from is a mystery that has not been resolved, as at no time in the history of the Argent mines had they been high producers of zinc and the prospecting values over the years before 1999 had never been higher than 7%. When Gold Fields were testing the values in the 1970s, Brakfontein was found to be the only possible source of zinc ore, with averages between 1.3% and 5% zinc. OTR never began operations on the Argent mines, because of the

¹⁰⁵ Gold Fields of South Africa file ARG820/1/1 GEOL (1) - Argent Project Geology, Volume 1, entry 17, ‘The Argent project – Final report’, report by D Campbell, Group Geologist, 15 March 1977, p. 12.

¹⁰⁶ Gold Fields of South Africa file ARG820/1/1 GEOL (1) - Argent Project Geology, Volume 1, entry 18, ‘Argent Lead & Zinc Co Ltd’, memo to MB Forsyth by D Campbell, Assistant Consulting Geologist, 28 July 1978.

¹⁰⁷ M Getz, ‘OTR suspends two directors’, Business report in *The Star*, Johannesburg, 20 January 1999.

internal corruption at director level as described in the news report and the whole operation dissolved.

With the ending of the Anglo-Boer War in 1902 there was a hiatus of approximately two years in the rebuilding of the economy of the old ZAR. The research has shown that the post-war Milner administration needed the revenue in the form of taxation from mining, but simultaneously saw little need to help the mining companies re-establish themselves. Although not a silver mine, Stippel's dissertation of the Crown Mines Gold Mining Company presents a representative mining story of the post-war years.¹⁰⁸ Crown Mines had been raided in 1900 by the Kruger forces who removed the bullion. When the British forces captured Johannesburg, the mine was raided again and stores of machinery and tools taken. The total loss to the mine in 1902 was over £70 000, none of which was ever recovered. The attitude so typical of governments, then and now, was taxation first and 'consequences not their problem'. For the silver mining industry of the greater Pretoria region, the post-1900 period to approximately 1906 was one of poor recovery. The surface buildings of Transvaal mine were badly damaged and reconstruction of events during the war indicates that it was British forces that were responsible for the damage. Despite putting in a claim for war damages the TSM Company received no compensation from the post-war British administration.

By 1906 venture capital was again becoming available and this is borne out by the recovery in the gold mining industry and is seen in the development of a new tin mining industry at Rooiberg.¹⁰⁹ More importantly for this dissertation was the re-prospecting of the greater Pretoria region for silver deposits. Although prospecting to the west and far southeast areas was to result in a number of mines being opened, all of them would fail after a few years, see Table 1. At the same time the Transvaal mine would see a resurgence of activity from 1907 to 1914, with various tribute mining companies attempting to make profits, but all were short-lived operations.

In 1919 the Argent mines were restructured and re-opened by the Albu brothers of General Mining and Finance Corporation in 1919. New approaches to beneficiation and

¹⁰⁸ S Stippel, *The Origin of Crown Mines Limited and its Formation in 1909*, Unpublished MA Dissertation, University of South Africa, Pretoria, 1962.

¹⁰⁹ G Nattrass, *Tin Mining in the Transvaal 1905–1914*, Unpublished MA Dissertation, University of South Africa, Pretoria, 1987.

mining techniques would make the mines at Argent the most modern and successful in the history of the silver mining industry in the greater Pretoria region. Although the mining period was shorter than was probably expected, it was highly profitable and during the eight years of its life, the Transvaal Silver & Base Metals produced 45 tons of silver and 16 000 tons of lead.

1927 to the late 1940s was a period of inactivity at the Argent mines, with the exception of geological prospecting by the Geological Survey. This was due to a number of reasons, the dominant one being the world economic recession from 1928 through to the late 1930s. There was little or no venture capital available and governments around the world were unable to re-inject capital into their economies. After the Second World War there was once again an economic lull in new ventures, primarily because of a general lack of development capital on a world level. European governments were more concerned with rebuilding not only their shattered countries, but also their shattered economies.

The re-opening of the Brakfontein mine in 1952 met one of the conditions for success – rising prices of lead and silver on the international metals market. Unfortunately the initial investment in draining the mines, prospecting and development costs was followed by a suspension of operations before yielding profitable returns due to the instability in the market.

Later in 1956, the rising market price of lead and zinc offered an opportunity to operate the Brakfontein mine, but only for about eighteen months before falling metal prices forced its closure again. It has not been possible to determine if the company actually made a profit from the 1950s venture, but after the closure the company kept its options open. In the 1970s both rising prices of lead, zinc and silver on the international metals market, coupled with the demand for zinc ore to feed to the new Zincor smelter in Springs, provided an incentive to re-look at the Brakfontein mine.

The early 1970s were to become a highly volatile period for resources, dominant of which would be oil. The international price of lead and silver was to rise to unprecedented heights, but it was a short-lived peak that would return to lower prices within a few years. As the deposit was not large enough by 1970s standards to be mined

economically, the mine went into permanent closure as a Gold Fields operation. It was therefore a surprise in the mining community when a small to medium size mining company announced an interest in the Argent mines deposit. However, it never materialised because of corruption problems within the company.

Since the beginning of 1999 no activity has been observed on any of the mines and none is expected in the future. So after a period of 114 years the silver mining industry of the greater Pretoria region had finally come to an end.

Chapter 5

REFLECTIONS ON THE SILVER MINING INDUSTRY OF THE GREATER PRETORIA REGION

The mining revolution that stirred the Highveld economy in the late nineteenth century created a condition of economic and cultural change within the Boer Republic of the Transvaal. A force overtook the agrarian economy that few economies have ever managed to contain – the force of capitalism. The drive for hidden riches be they diamonds, gold or silver was to bring to the ZAR an army of the world's miners, seeking their personal fortune. The majority would be hard-working, hard-living men – men who would not be out of place in the gold rushes of Alaska or Australia, or the tin and copper mines of Cornwall in England. A few would be the men who made their fortunes in diamond and gold mining. For some of those, the rewards of hard work and investment would be power, wealth and a grandiose title – the Randlords. For the sleepy, agrarian based economy of the ZAR, mineral wealth would become a curse of intrusive elements bringing foreign ways, languages and religions and ultimately demands for voting rights. The Republic's more progressive burghers [citizens] welcomed the new industries as a means to take the Republic forward and into a stronger financial economy, one which could possibly face the expansionist British Empire head on.

The Randlords were certainly some of the most powerful men - economically, socially and to a degree politically. The dissertation looked at the concept of 'Randlord', and focussed on those who were involved in the early silver mining industry and what role they played. The silver industry was just one aspect of their multi-dimensional interests. For the majority, gold mining was their dominant focus with the primary objective being the amassing of wealth. For most of them, diamonds from Kimberley was the starting point that allowed them to become the power brokers of the Barberton and later the Witwatersrand goldfields. Their role in the development of the silver mining industry was both as financiers and as directors. If money could be made from silver mining, the Randlords became involved. H Eckstein & Co emerged as the dominant mining and financing company that would ultimately control the two largest and richest silver mines. Many of the Randlords would continue their control of various industries

after the Anglo-Boer War and a few would become involved in the next phase of silver mine development in the early twentieth century.

Not all of the silver mining ventures of the 1880s and 1890s were the investment brainchild of the Randlords. The 1880s were still the time of the individual prospector or small syndicate searching for the elusive rich strike. The smaller investor, the middle management of many industries, would become the shareholders of the more successful silver mines and in turn would become rich themselves and in a few cases, become the directors of mining and finance in the early twentieth century. Approximately 30 mines existed during the period under review and of those; about 25 were created in the 1880-1890s. Few lasted for more than two years and it was shown how most of them had ceased to exist by 1892, primarily because of the collapse of the international price of silver.

Throughout the 114 years of the Pretoria silver and base metal mining industries, they have been directly influenced by metal exchange prices, and the economics of mining silver has been shown to closely follow significant price fluctuations as substantiated by the graph in chapter 1. The results are not only interesting in terms of how the metal prices have fluctuated over the 120-year period, but how the prices of the two metals can be shown to bear a direct relationship with the periods of mining, i.e. 1890s, 1920s and the 1950s. The graph also demonstrates how the timing of development of the mines was such that as they got to a production stage the prices of the metals began to fall, leading to mine closure within a few years. The non-mining 1970s period was also plotted and demonstrates the fickleness of the metal market, with its unpredictable rises and falls. The falling prices of silver and lead in the 1970s sealed the fate of the mines, with their relatively small ore body volumes by modern mining standards, to remain closed - most probably forever.

Both politics and economics played very important and interwoven roles in the early development of the silver mining industry. The opening chapter discusses the major events that had a direct and indirect impact on the industry. Politics, even today, plays a significant role in the various mining industries around the world. In the 1890s it became both a bargaining chip for the Kruger government and a persuasion tool for the H Eckstein company. It was shown how both sides gained from the relationship. Kruger

got the loans he needed for financing the NZASM railway as well as the National Bank project and the Randlords benefited by their silver mines not being declared as public diggings and having unfair taxation imposed on the mining of silver.

Bad choices in the selection of senior mine management such as the mine managers, smelters or consulting engineers in the 1890s by the Randlord directors further hampered the operation of the silver mines. At the Albert, Willows and the Transvaal mine the problem was a recurring theme in the correspondence between Randlords. Otto Hahn at the Transvaal mine, M Eissler at the Albert mine and Sidney Jennings at the Willows mine, illustrate the ineptitude in staff selection.

The principle role of mining is to extract ore to sell and return profits to the shareholders. One of the greatest weaknesses in the 1890s silver mining industry was the underestimation of the amount of working capital that would be needed to open and operate the silver mines. In most cases, the companies were created with insufficient working capital, resulting in the closure or refinancing of the mine. Development of the mines was carried out to such an extent that when the mine was ready to start extracting the ore, insufficient working capital remained for the operation. The managers of the Albert, Willows, Edendale and Argent mines were major culprits in this type of problem. For example the Willows mine constructed all of the surface housing and beneficiation plant before any ore was brought to surface.

The mining of silver in the greater Pretoria region is one of the lesser known facets of South African mining history. It has been shown that it was not only a young industry to the ZAR, but provided it with links to alternative sources of revenue for high-profile State projects in the 1890s. The research into the various mines has been exhaustive. The history of the less productive mines that did not form part of the text of this dissertation will, it is hoped, be transformed into an article for future publication. The Transvaal mine of the 1890s and 1920s was at the forefront of modern equipment in the surface beneficiation equipment and this could provide an interesting study topic in the field of mining engineering. Certainly the 1920s Argent mines saw significant investment in modern technologies of silver and lead recovery.

Establishing the profitability of the silver mining operations has been impossible, because the sources declaring profits are too few to establish patterns. It would seem that the principal mines discussed in this dissertation did make profits for the shareholders - certainly the Willows and the Argent mines did.

In reviewing the output of silver in South Africa in the 1890s and 1920s, it was a significant amount in South Africa for the times; by world standards for the 1880-1890s, it most definitely was not. When one considers that the Bland-Allison Act of 1878 required the US government to purchase 127.5 tons (4.5 million ounces) of silver per month and a large percentage of that was met by the output of the Comstock silver mine in Nevada, USA, South Africa's output was insignificant.¹ By modern South African standards, the 45 tons of silver produced by the Transvaal Silver & Base Metals Company - in the seven years of operation in the 1920s - has been shown to be approximately equal to a quarter of the current annual output of silver produced by the gold and platinum mines today. The silver mining industry of the greater Pretoria region is part of the story of the development of South African mining and it is a facet of South Africa's history that has never been told.

¹ A Weinstein, 'The Bonanza King Myth: Western Mine Owners and the Remonetisation of Silver' *The Business History Review*, vol. 42, no 2 pp. 195-218.

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Appendix 1 - Glossary of Mining Equipment & Mining Terms

Adit - a horizontal passage or tunnel driven from the sloping surface, such as on a hill, to give access to the working area of a mine.

Argentiferous - metallic ore contain silver. Thus argentiferous lead is lead ore containing appreciable levels of silver.

Assay - the testing of ores or minerals using chemical tests, or modern scientific instruments, to determine the proportions of metals in the ores.

Backs - the height of ore above a given working level; thus if the first level is at 30 m and the shafts and drives are all developed the mine is said to have 30 m of backs.

Ball Mill - a rock pulveriser in which balls of metal are enclosed within a near horizontal large rotating cylinder. As rock is fed into the cylinder it is broken by the attrition of the rotating balls.

Battery - a machine enclosing 3 or 5 crushing stamps, or a series of such stamp mills in line, driven from a common shaft and forming a battery or stamp mill.

Bed - a common geological term meaning layer or stratum.

Blake Jaw Crusher - the original crusher of the jaw type, a crusher with one fixed jaw plate and one pivoted at the top. This is usually the primary crusher for ore that is then taken to a secondary crusher to be reduced further.

Blast furnace - a type of smelting furnace in which a blast of air is introduced during the smelting operation. Small versions of such furnaces can be used for the smelting of copper, tin and lead ores. Larger versions are used in the smelting of iron ores.

Bullion - a smelted alloy of metals containing sufficient precious metals – silver or gold - to make the recovery of them economical - the dissertation mentions lead bullion or smelted lead containing silver.

Claim - in South Africa a portion of land to which a miner is legally entitled to search for or mine metal ores or precious stones. It was an area of 150 feet by 400 feet (45.72m x 121.92m).

Cap – See **Shaft cap**

Care and maintenance – an engineering term especially among mechanical and mining engineers. It implies shutting down and looking after plant and machinery not in productive use such that it can be brought back into productive use at a future date with very little effort or major expense.

Cocopans - a term used in South Africa to describe a rocker-dumping type of tipper truck.

Compartments – a shaft is usually divided into two or more compartments or sections, separated by framed timbers and planking. The main compartments in a winding or hoisting shaft are usually two cages for personal or two cages for personal and two skips for hoisting the ore. The latter would then be designated a four compartment shaft.

Concentration - the separation and accumulation of economic minerals from the host or waste rock, or gangue. The final concentrate is then passed to, or bagged and shipped to a smelting process.

Country rock - the valueless rock surrounding or penetrated by mineral veins or ore deposits.

Cross-cut - an underground passage directed across an ore body to test its width and value, or a passage from the shaft to reach the ore body.

Deposit - a mineral or ore deposit is used to designate the natural occurrence of a useful mineral, or an ore, in sufficient extent and degree of concentration to make it economical to exploit.

Desulphurising plant – usually a plant with a type of roasting oven in which the sulphur is driven off or reduced in ore prior to smelting.

Development – the work done in a mine to open up the paying ground or reef, specifically to form drives or haulages around blocks of ore.

Dip - the angle at which a bed, stratum, or vein is inclined from the horizontal.

Drift - a horizontal passage underground, often synonymous with drive as defined below.

Drive - an underground passage for exploration, development or working of an ore body. Drives are made at appropriate levels below the surface. In a working mine, ore from the stopes above the level descends to the drive below and is then conveyed along that drive to the shaft for raising to the surface.

Dyke; Dike - a tabular body of igneous rock that, when molten, was injected into a fissure, that cuts across the structure of the adjacent country rocks, and which is usually vertical or has a very high angle of dip. Metallic mineral ore deposits are often associated with dykes. The variance is UK or USA spelling.

Fault - a fracture or a fracture zone in rock, along which there has been displacement of the two sides relative to one another parallel to the fracture. The displacement may range from a few centimetres to kilometres.

Fines – the fine product of crushing and sieving and which would ultimately be concentrated as a metallic powder prior to bagging or smelting.

Fissure vein - a mineral mass filling a fracture or fault line in the country rock.

Flotation plant - a plant where mineral particles are separated using a froth of water and a variety of reagents such that some particles float and others sink. Oil flotation merely uses oils between the water a froth to capture some mineral particles.

Foot-wall - the wall or rock under a vein, also a general term for the floor in drives.

Frue Vanner - an ore-dressing apparatus consisting, essentially, of a rubber belt travelling up a slight inclination. The material to be treated is washed by a constant flow of water while the entire belt is shaken from side to side.

Gangue - undesired or waste minerals associated with or a component part of the metallic ore. They are mostly non-metallic minerals and some of the most common of the gangue minerals consist, essentially, of iron oxides.

Godfrey furnace - a furnace with an annular hearth used for roasting sulphide ores to drive off the sulphur leaving oxides of the metallic ores.

Grade - the classification of ore samples or an ore body according to the percentages per ton of ore. Below a certain grade it becomes uneconomic to work the deposit, so it is a means of determining how rich or poor the deposit is and its economic viability.

Hanging wall - the wall or rock on the upper side of an inclined mineral vein or the part of vein being removed.

Haulage - the drawing or hauling of ore and waste rock. It is also used as a term to describe the drive along which narrow gauge rails have been laid for the use of cocopans or tipping trucks.

Headgear - the frame that sits at the top of a shaft with the pulley wheels which are used for hoisting the ore or men up and down the shaft.

Incline - a shaft or drive that is not vertical, usually on the dip of a vein. An inclined tunnel connecting two levels.

Jaw crusher - a primary crusher designed to reduce large rocks or pieces of ore to a size that is capable of being handled by the secondary crusher.

Jig - a device used in ore dressing that separates crushed fine rock particles into different categories to eliminate waste from economic metallic particles.

Kibble - a steel bucket used in shaft sinking for both the lowering and raising of men, equipment and rock.

Lens deposit - a body of ore or of rock, thicker in the middle than at the edges, similar in shape to a double convex lens.

Levels - it is common to space horizontal drives in a mine at regular intervals in depth. They are either numbered from the surface in numerical order or designated by their actual elevation below the top of a shaft.

Lode - strictly, a fissure in the country rock filled with a deposit of potentially economic minerals; usually applied to metalliferous deposits. A lode can be described as a deposit with one or more veins spaced closely together such that they can be mined as one deposit.

Matte - a metallic sulphide mixture made by smelting copper and/or lead ores. If the ore is not roasted first the matte may contain high values of sulphur as was discovered at the Willows mine.

Mill - the reduction plant where the ore is crushed, ground to fines, concentrated and possibly smelted. A general term for the modern reduction plant.

Ore - a natural mineral compound of the elements of which one, at least, is a metal.

Ore at grass - ore stacked or dumped, literally, 'on the grass' awaiting treatment or shipment.

Ore-Dressing - the cleaning of ore by the removal of certain valueless portions in the process of crushing and jigging.

Ore-shoot - a concentration of primary ore along certain parts of a rock opening. Usually a rich aggregation of economic minerals in a vein or lode.

Pipe - an elongated body of mineral; a narrow portion of rich ore extending down the lode.

Poll Pick - a pick with a small sledge-hammer head (Poll) on the one side and pick point on the other. Used to knock in props or break off loose rock after blasting.

Reef - a bedded layer deposit of mineral rich ore extending over a very wide distance. It often dips at an angle and so can go to great depth such as the Witwatersrand gold reef. Usually the term reef refers to an ore containing a precious metal as the dominant mineral such as gold or platinum reefs.

Roaster - an oven designed to convert sulphide ore to metallic oxides by driving off the sulphur content of the ore.

Scouler Table - a type of shaking concentration table for separating mineral grains from waste grains – used in concentration plants.

Shaft - a vertical opening designed for the use of hoisting equipment to raise and lower men and rock.

Shaft cap - Usually a concrete capping to an abandoned shaft, constructed to prevent people and animals falling into the shaft. In some cases there may be a manhole access point as at Argent.

Shaft collar - The main structure of concrete, wood and steel around the top opening of a shaft.

Smelting - a distinct process where metal containing ores are converted to molten metal and molten slag.

Stamp-Mill or Stamp Battery - One of the earliest mechanised means of reducing ore and rock to smaller pieces. The stamp battery was a machine consisting of a rectangular frame carrying 3 or 5 vertical stamps or heavy metal pounders that were raised up and dropped onto the lumps of ore, thereby crushing the ore.

Stope - an underground excavation from which the ore has been removed, leaving a large cavity in that part of the mine.

Stringers – a small filament vein within the rock of an ore body or lode.

Tribute Lease - a lease between the owners of a mine and a syndicate or private individuals who agree to work the mine and pay the mine owner a percentage of the profits of the ore sold. It is a method where a mining company, after shutting down their own mining operations usually because of high operational costs, allows a smaller operator to do the mining. This often saved companies from closing the mine down.

Tuyere - a tube or opening in a metallurgical furnace through which air is blown as part of the extraction or refining process. Tuyeres as tubes can be water cooled metal tubes as in modern blast furnaces or made of refractory clay as in smaller or earlier units.

Vein - a zone or belt of mineralised rock, often extending over considerable distances. The vein would be the part containing the metal ores.

Wilfley table - a long established and widely used form of shaking table designed to sort or classify heavy metal ores from lighter elements.

Winze - a vertical or inclined opening connecting two levels in a mine. A surface winze is often a small inclined tunnel designed to test an ore deposit. It is sunk from surface to intersect the ore deposit.

Appendix 2 - Biographical notes on people mentioned in the dissertation

Albu, Sir George, – 1857-1935. Randlord mining magnate; came to South Africa in 1876; was a diamond merchant in Kimberley 1876-89; subsequently settled in Johannesburg and established, with his brother, the firm of G & L Albu; formed General Mining and Finance Corporation 1895, with himself as managing director. Was instrumental in re-opening the Argent mines in 1919 and formed the Transvaal Silver & Base Metals Company.

Albu, Leopold, - 1860-1938. Randlord mining magnate and he was the brother of Sir George Albu. He was a director of General Mining and Finance Corporation in London.

Andersson, Lt. Colonel Sir Charles Llewellyn, soldier and pioneer of Johannesburg; born and bred in Cape Town; during WWI Andersson commanded a battalion of the Northamptonshire Regiment; severely wounded at the Somme in 1916, he was captured by the Germans in 1916. He was a founder member and secretary of the Wanderer's Club in Johannesburg in the 1890s; an accountant he founded the firm of Andersson and Whiteley in 1903. He became chairman of the Sallies Gold mine and a director of the Pretoria Silver Lead Mine Ltd. He was knighted in 1922; built and lived at 'Dolbran' in Parktown.

Bailey, Sir Abraham (Abe), - 1864-1940. Randlord mining magnate and politician; stockbroker in Johannesburg in 1887; acquired extensive mining interests; formed South African Townships, Mining & Finance Corporation; member of the Reform Committee sentenced and fined £2000. At the time of the trial he was a director of ten gold mining companies. Member of the Cape Legislative Assembly 1902-5 and Transvaal Legislative Assembly 1907-10; Union House of Assembly 1915-24; from 1902 he became heavily involved in tin mining in the Transvaal, he was a director of the Transvaal Silver and Lead Company on the farm Roodekrans 1906-1907.

Bain, Charles (Chas) Alfred Oliver, Johannesburg pioneer; took over his father's mineral-water bottling business, in Beaufort West in the early 1880s; he arrived in Johannesburg and soon became well known as a mining agent; he was also a founder member of the Wanderer's Club. From 1920-1924 he was chairman of the Pretoria Silver Lead Mines Ltd.

Barnato, Barnett Isaacs (Barney), 1852-1897. Randlord mining magnate, financier; born in London arrived in Kimberley 1873; established, with his elder brother, Harry, Barnato Bros., Diamond dealers; amalgamated large diamond holdings into Kimberley Central Diamond Mining Co. which he was later forced by Rhodes and his allies to merge with De Beers, of which Barnato became Life Governor. Acquired large interests on the Rand 1888-89; established Johannesburg Consolidated Investment Co in 1889; it is believed that he may have committed suicide off of Madeira. He was chairman of the initial phase of the Transvaal Silver Mines Ltd.

Beckett, Thomas William, 1851-1924. Pretoria merchant, he helped to found and became chairman of the National Bank in the 1890s; director of the Albert (Silver) Mine Ltd 1886-1889, and of Mundt Silver Mining Prospecting & Developing Syndicate - 1889.

Beit, Alfred, 1853-1906. Randlord mining magnate and financier; came to South Africa in 1875 as diamond buyer and merchant at Kimberley; became a partner in the firm of Jules Porges in 1888 and on the retirement of Jules Porges in 1889, a partner in the reconstituted firm of Werner, Beit & Co. Provided much of the expertise and financial backing which enabled Rhodes to carry through the De Beers amalgamation in 1888. On the discovery of gold on the Witwatersrand, he founded the firm of H Eckstein & Co in Johannesburg. He was actively involved as a director of the Transvaal Silver Mines Ltd, and through H Eckstein Co the control of the Willows Copper (Argentiferous) Syndicate Ltd.

Boyd, Henry Crawford, 1870-1952. Company manager; arrived in Johannesburg in 1896; joined H Eckstein & Co. Appointed local manager of Central Mining & Investment Corporation Ltd 1911-20; chairman of the Transvaal Silver Mines Ltd in 1905.

Churchill, Lord Randolph Henry Spencer, British Statesman; entered House of Commons as a Conservative in 1874; secretary of state for India, 1856-86; Chancellor of the Exchequer and Leader of the House of Commons in 1886; visited South Africa and visited the Transvaal Silver Mines Ltd in 1891.

Clench, C, Foundation member of the first Chamber of Mines in 1887, director of Albert (Silver) Mine Ltd.

Eckstein, Sir Friedrich Gustav Jonathan, 1857-1930. Randlord mining magnate; brother of Hermann Eckstein; joined the firm of H Eckstein in Johannesburg, 1888-1901; become a partner in Werner, Beit & Co in London 1902-10; appointed director of Central Mining & Investment Corporation Ltd 1911; elected to the chairmanship 1912; resigned 1914, director of the Transvaal Silver Mines Ltd.

Eckstein, Hermann Ludwig, 1847-1893. Randlord mining magnate; came to South Africa in 1882 as manager of the Phoenix Diamond Mining Co at Dutoitspan in Kimberley; founded the firm of H Eckstein in Johannesburg in 1887. One of the founders and the first President of the Transvaal Chamber of Mines until 1892 when he resigned and went to London as partner in Werner, Beit & Co. Director of the Transvaal Mines Ltd also deeply involved in the decisions connected with the Willows mine, Edendale mine and advised Nellmapius with regard to aspects of the Albert mine.

Eissler, Manuel, Consulting Engineer at the Albert mine, he was recognized internationally as an authority on lead, copper and silver deposits, writing several books on the subjects of which *The Metallurgy of Silver* (1891) was the most famous. He had been assistant assayer to the United States Mint and in 1891 was appointed as consulting engineer to the Albert mine.

Farrar, Sir George Herbert, 1859-1915. Randlord mining magnate and politician; chairman of the Anglo-French Exploration Co and of the East Rand Propriety Mines Ltd; was a leading member of the Reform Committee at the time of the Jameson Raid in 1896 and after the trial was sentenced to death for treason. Became the leader of the Transvaal Progressive Association after 1904; elected to the Transvaal Legislative Assembly 1907; Transvaal delegate to the National Convention 1908-9; member of the Union House of Assembly 1910-11. He was involved as a director of the Witpoortje Syndicate Ltd, Boschpoort Silver Mining Syndicate. Later he became a director of Transvaal Silver Mines Ltd.

Farrar, Sidney Howard, 1857-1917. Company director; brother of Sir George Farrar; London director of several South African gold mining companies; was a director of Boschpoort Silver Mining Syndicate and the Transvaal Silver Mines Ltd.

Ford, Lewis Peter, 1846-1925. Lawyer, businessman and Johannesburg pioneer; become a partner in the Randjeslaagte syndicate with Carl and Julius Jeppe and founded the townships of Jeppe and Fordsburg, the latter being named after him.

Fox, Samuel, 1845-1833. Pioneer of early Johannesburg, arriving in 1885 before it had been proclaimed. He became a successful speculator, owning in partnership with Isaac Sonnenberg a large part of the central area of Johannesburg. Fox street is named after him. Fox was the original owner of Orange Grove, purchasing it for £8000 and selling it for twice that amount. He was a co-defendant in the "Deep levels case" with the Transvaal Silver Mines Ltd (see text). He died in poverty in the Witbank district.

Hanau, Carl, 1855-1930. Company promoter and director; partner in S Neumann & Co; later represented Barnato Bros in South Africa; member of various syndicates on the Witwatersrand, including the Coronation Syndicate which he founded 1902. He is reputed to have died in poverty. He was a director of Boschpoort Silver Mining Syndicate and a shareholder in Transvaal Silver Mines Ltd.

Hahn, Otto H, He trained as a metallurgist in Germany and then travelled to the United States where for twenty years he developed the smelting of lead ores writing many papers on the subject and becoming a contributor to the rapid development of American metallurgy. He was appointed as manager of the Transvaal Silver Mines Ltd in 1889 but was fired in 1892.

Hofmeyer, Harry J, solicitor and pioneer of Johannesburg; close friend of Chas Bain (see above); became Mayor of Johannesburg in 1910; director of Pretoria Silver Lead Mines Ltd.

Jameson, Samuel W, 1849- ? brother of Leander Starr Jameson of the Jameson Raid; Samuel was involved in mining and was a director of nine gold mining companies as well as the Transvaal Silver Mines Ltd and the Willows Extension Silver Mine Syndicate Ltd. He was a member of the Reform Committee sentenced and fined £2000. At the time of the trial he was a director of nine gold mining companies as well as the Transvaal Silver Mines Ltd.

Jennings, Sidney Johnston, 1863-1928. Mining engineer; brother of Hennen Jennings; employed as Mine Manager on the Witwatersrand 1893-98. Joined H Eckstein & Co 1899, appointed Consulting Engineer to the group in 1900. Was the mine manager/smelter at the Willows Copper (Argentiferous) Syndicate Ltd in the early 1890s, also involved with the Transvaal Silver & Lead Mines Ltd 1906-1907.

Jennings, Hennen CE, 1854-1920. Mining engineer, Consulting Engineer to H Eckstein & Co and to Wernher, Beit & Co - 1898-1905; returned to the Witwatersrand 1902-3 to advise on the reorganization of the mines after the Anglo-Boer War. Was the Consulting engineer to the Transvaal Silver Mines Ltd and also advised on the Willows Copper (Argentiferous) Syndicate Ltd.

Jepe, Carl Frederick Wilhelm, 1859-? He was a lawyer; miner and Johannesburg pioneer; partner in the Randjeslaagte Syndicate with his brother Julius and, with Lewis P Ford. Jeppetown was named after the two Jepe brothers; director of the Albert (Silver) Mine Ltd, and the Victoria Regina Silver & Copper Mining Co Ltd.

Joel, Soloman (Solly) Barnato, 1865-1931. Randlord mining magnate; nephew of Barney Barnato; succeeded his uncle as head of the Johannesburg Consolidated Investments Co (JCI) after the death of his elder brother in 1898; extended the gold mining interests and its major involvement in De Beers after 1900. Member of the Reform Committee sentenced and fined £2000. At the time of the trial he was a director of thirty gold mining and other companies. Was a director of the Transvaal Silver Mines Ltd in 1889-1890 and was involved in the short-lived Willows Extension Silver Mine Syndicate Ltd 1889-1893.

Joubert, Christian Johannes Jacobus, 1834-1911. Minister of Mines in the South African Republic; he was a director of the Albert (Silver) Mine Ltd in the late 1880s.

King, Henry James, 1849-1920. He was a company director. Partner of the S Neumann & Co; served on the London Committee of the Premier (Transvaal) Diamond Mining Co; member of the Reform Committee sentenced and fined £2000. At the time of the trial he was a director of seventeen gold mining companies as well as the Transvaal Silver Mines Ltd.

Kynoch George, 1834-1891, The founder and managing director of Kynoch, the largest ammunition manufacturer in Britain in the 19th century; he retired in the late 1800s and emigrated to South Africa; he became a director of Nevada Silver & Smelting Co Ltd in 1888 and also shareholder of the Transvaal Silver Mines Ltd in 1889-1890.

Langermann, Sir Jan Willem Stuckeris, 1853-1932. Mining industrialist and politician; managing director of the Robinson Group of Mines and of Randfontein Estates GMC Ltd.; elected to the Transvaal Legislative Assembly 1907; member of the Union House of Assembly for many years; President of the Chamber of Mines 1909-10; he was a director of the Willows Copper (Argentiferous) Syndicate Ltd, 1888-89. He was involved with H Eckstein & Co through Lionel Phillips in 1891 with the Rondevlei Silver prospect.

Lewis, Isaac, 1849-1927. Randlord industrialist; began prospecting at Kimberley in 1870 with his cousin Samuel Marks with whom he established the firm of Lewis and Marks; They were heavily involved with land and mining interests in Barberton and later started coal mines at Vereeniging. They were closely involved with the control of the Hatherly Distillery near Pretoria and their firm established the Union Steel Corporation in 1913. Both Lewis and Marks were directors of the Albert (Silver) Mine Ltd.

Lippert, Edouard Amandus, 1853-1925. Randlord industrialist; cousin of Alfred Beit; moved from Kimberley to Johannesburg, secured valuable industrial concessions from President Kruger, the greatest of which was the manufacturing of dynamite; established a factory at Modderfontein in 1894. He was a large shareholder in the Transvaal Silver Mines Ltd in 1889-91. He lost most of his fortune due to the post-1920 hyper-inflation in Germany and died in poverty.

Marks, Samuel (Sammy), 1843-1920. Randlord industrialist; arrived in South Africa in 1868 and went to Kimberley where he soon became financially successful. For other details see entry on Isaac Lewis.

Michaelis, Sir Maximilian, 1860-1932. Randlord mining magnate and art patron arrived in South Africa in 1872 and settled in Kimberley where he went into partnership with both Wernher and Beit. Shareholder in Transvaal Silver Mines Ltd.

Molengraaff, Gustaaf Adolf Frederik, 1860-1942. A Dutch geologist, biologist and explorer; He became an authority on the geology of South Africa and the Dutch East Indies. In 1888 Molengraaff took a job as a teacher (later as professor) at the University of Amsterdam. In 1897 Molengraaff became "State geologist" of the Transvaal Republic. His task was to start the geological survey of the Transvaal. While mapping the Transvaal he discovered the Bushveld complex. He returned to South Africa in 1901 to work as a geological consultant. The Anglo-Boer War had his attention and one of his ideas was to give each soldier a small tin identity card, which later became practice in armies around the world. In 1906 he became professor of geology at Delft University.

Mosenthal, Julius G, 1853-1918 Stockbroker both in early Johannesburg and later in London. Although a son of Joseph Mosenthal, one of the founders of the wool exporting firm of Mosenthal Brothers, Julius was not involved in the firm. He was involved in the early development of mining companies in Johannesburg and was a shareholder in the Willows Copper (Argentiferous) Syndicate Ltd. He left South Africa probably around the time of the Anglo-Boer War (1899-1902) by 1903 he is recorded as a stockbroker on the London Stock Exchange.

Murray, Sir Thomas Keir, 1854-1936. Born in Natal he was a diamond digger at Colesburg Koppie at the age of 17. He was responsible for expanding the Natal Railway to the Transvaal. He was also a Natal soldier, farmer and politician. He was the main financial backer for Zaaiplaats Tin Mines and owner of the Edendale Lead Mine 1908-1909.

Nellmapius, Alois Hugo, 1847-93. Industrialist; came to South Africa in the early 1870s; acquired mining claims at Pilgrims Rest; Started a transport business between Maputo and parts of the South African Republic; settled in Pretoria; became a close friend of President Kruger through whom he received important industrial concessions which he then used to form close associations with the firms of H Eckstein & Co and Lewis & Marks. He was directly involved with the formation of the Albert (Silver) Mine Ltd and became one of its directors.

Neumann, Sir Sigismund, 1856-1916. Randlord mining financier; came to Johannesburg from Kimberley; founded the firm of S Neumann & Co; closely associated with H Eckstein & Co in several mining ventures; major shareholder in the Transvaal Silver Mines Ltd in the 1890s.

Niven, Andrew Mackie, 1854–1928, Stockbroker and businessman; educated in Glasgow and Liverpool. Immigrated to Natal in 1881 and then moved to Johannesburg in 1888 setting himself up as a stock and share broker with partners J Mackillican and JN Greenless. In 1894 he opened his own business focusing on mining stock. He was a founder member of the Chamber of Mines; became involved in the Reform Committee and at his trial was sentenced and fined £2000. After the Anglo-Boer War he returned to Johannesburg and became involved in Municipal committees and local politics from 1903-1921. He was a director of the Pretoria Silver Lead Mines Ltd as well as a number of gold mines.

Phillips, Sir Lionel, 1855-1936. Randlord mining magnate, financier, politician and benefactor; he managed the diamond claims of JB Robinson. He served as President of the Chamber of Mines (1893-94) and was a senior partner of H Eckstein and Co. He was chairman of the Reform Committee and after the Jameson Raid (1895) he was arrested along with the other members of the committee and at the end of the trial was sentenced to death for treason. The sentence was commuted to a large fine and he relocated to London, until returning in 1906. Became CEO of Central Mining & Investment Corporation; survived a near fatal assassination attempt in 1913, retiring at the end of 1924. In the 1890s he was chairman of the Transvaal Silver Mines Ltd until arrested for the Reform Committee activities. He was also closely involved with the Willows Copper (Argentiferous) Syndicate Ltd.

Roets, Mrs Cathrina, former owner of a portion of the farm Dwarsfontein. It seems that her portion was where the main shaft of the Transvaal Silver Mines Ltd of the 1890s was located. She witnessed the destruction of the mine buildings in July 1901, during the Anglo-Boer War. In 1919 General Mining mentioned the acquisition of the Roets portion of Dwarsfontein in their files.

Rogers, HA, a businessman also member of the Reform Committee sentenced and fined £2000. At the time of the trial he was a director of ten gold mining companies as well as the Transvaal Silver Mines Ltd, and had also been a director of the Victoria Regina Silver & Copper Mining Co Ltd.

Skill, Octavius James, 18? – 1892. He was a claims broker in Kimberley in the 1870s; the next reference to him is as the mine manager/director of the Willows Copper (Argentiferous) Syndicate Ltd in 1888; by 1890 he is loaning the company considerable amounts of money. He was in continuous discord with H Eckstein & Co especially JB Taylor. Skill was a director of the Willows Copper (Argentiferous) Syndicate Ltd right up to the time of his death in 1892.

Struben, Hendrik Wilhelm (Harry William), 1840-1915. Gold mining pioneer, trader and farmer; brother of Fred; became first President of the Chamber of Mines in 1887; served on the Diggers' Committee and on a commission that framed the gold laws of the Transvaal Republic. Director of several mining enterprises; discovered argentiferous copper on his farm The Willows around 1883-4 and was one of the original directors of the Willows Copper (Argentiferous) Syndicate Ltd in 1888.

Struben, Frederick Pine Theophilus, 1851-1931. Geologist and prospector; prospected for gold in Barberton area and returned to Witwatersrand in 1883; with his brother Harry they discovered the Confidence Reef in early 1885.

Taylor, James Benjamin, (JB), 1860-1944. Randlord mining financier; arrived in Kimberley 1871; became a stockbroker in Barberton. Founded the company of H Eckstein & Co with Hermann Eckstein in 1887; retired from the firm in 1894. He was deeply involved as a director of the Willows Copper (Argentiferous) Syndicate Ltd and to a lesser extent with the Transvaal Silver Mines Ltd.

Tilney, George Adams, died 1889. Mining pioneer and speculator closely associated with H Struben in early gold mines of Johannesburg and especially the Crown Reef Gold Mine of which he was a director. He was also a director of the Transvaal Silver Mines Ltd under Barnato.

Williams, John Richard, 1862-1941. Consulting metallurgist to H Eckstein & Co; appointed reduction manager of the Crown Reef Gold Mining Company Ltd in 1888. After leaving the Eckstein Company, he formed a syndicate with Sir Aubrey Woolls-Sampson to operate the old Transvaal mine on a tribute basis in 1908, but the venture was a failure.

Woolls-Sampson, Colonel Sir Aubrey, 1856-1924. Soldier and politician; fought alongside the Boers in Ferreira's Horse, in the Sekhukhune War in 1878; served with Buller in the Zulu War of 1879 and with Nourse's Horse in the siege of Pretoria in 1881; He was imprisoned as a member of the Reform Committee and like Karri-Davies refused to compromise over the political ban; founder member of the Imperial Light Horse with which he served in the Anglo-Boer War. Employed by Abe Bailey's Finance Co.; member of the Transvaal Legislative Assembly, 1907-1910, and of the Union House of Assembly 1910-15. He was involved with John Williams in the Transvaal Silver Mines Tribute Syndicate Ltd in 1908.

Note: biographical information was not found on everyone mentioned in the text.

Appendix 3 - Development of the total production for some of the silver mines

In an attempt to provide production figures for each of the mines when they were in operation, various sources have been used. The period prior to 1900 proved the most difficult for obtaining values. If figures detailing total tonnages mined and the metals or concentrates produced or even yields per ton of the metals were ever officially produced, they have not been found in archival material. For the pre-1900 mines the lack of records is understandable, as only a few silver mining companies were listed on the stock exchange at the time, these being the Albert, Willows, Nevada, White Swan and Transvaal mine (TSM) at Argent. Of the five, only the TSM produced regular company reports for the years of production 1889-1895.

Two company reports dealing with the Willows mine were found. The only other sources for company financial and production data were the reports in the *Standard and Diggers' News*, *The South African Mining Journal* and the review of the mines in CS Goldman's review of mines in 1892. After 1900, contemporary newspaper reports provided some of the details, but one of the best sources was PH Allport's analysis of mine company production returns to the then Department of Mines, for the period 1903 to 1938. For details of the Argent mines after 1950 the company files of Gold Fields of South Africa were the only source. Note in this appendix the word 'silver' has been omitted after the names of the mines as they are all silver mines in the discussion.

Table 2 in chapter 1, showing the production figures for the mines mentioned in this dissertation, is believed to be the first attempt to create the consolidated total outputs for all of the silver mines. In the case of Edendale, Willows and the Argent mines (the only significant producers), the author has tried to recreate the possible outputs in values per ton of the main metals produced, viz. copper, lead, zinc and antimony and the possible output quantity of silver in kilograms. Average values have had to be calculated in a number of cases and are based on the limited actual values available. Where actual and calculated values are indicated in a table - the actual, from sources - is shown in red. In some cases average values have been calculated and then used to calculate possible metal production.

In calculating the grades of the ores and the value in ounces per ton of ore the following formulas are used:

| | |
|---|---|
| $\text{grade of metal} = \frac{\text{metal estimated from assay of ore}}{\text{total ore mined}}$ | $\text{silver ozs/ton} = \frac{\text{ozs assayed}}{\text{ore mined in tons}}$ |
|---|---|

The tables show that the production was probably far greater than the current literature sources would indicate. For example, the greatest surprise was the Willows mine. As stated above, no production figures have been found in any government publication, yet from newspaper sources and two company reports it has been possible to establish that they mined approximately 13 000 tons of ore, from which they produced 500 tons of copper and, significantly, 14 tons of silver. In all cases tons are stated in long tons, which convert equally to metric tons. As the grades in the sources are stated in ounces, they are used in the tables, but are also converted to kilograms or kilograms/ton. Rather than put the calculations and

resultant tables in the chapter on economics it has been decided to place the data in this appendix and transfer the final figures for the Argent, Edendale and Willows mines to Table 2 in chapter 1.

The relevant sources used for the data per year are cited for each table and appear as footnotes for the Willows mine. The sources for the Edendale and Argent mines are tabulated below each respective table for Edendale and Argent and they do not appear as footnotes. Citation reference numbers appear within the data entries of the tables

Edendale Mine

Only two sources were found for values or tonnages produced at the Edendale mine. The major sources were Allport's report¹ and the tonnage of ore produced in 1890-99 from a letter in the Archives of H Eckstein & Co.²

Table 1 - Edendale mine showing sourced (red) and calculated figures (black) for the production of lead and silver between 1890 and 1938

| Year | Lead ore (tons) | % lead | Potential lead (tons) | % zinc | Potential zinc (tons) | grade silver ozs/ton | Potential silver ozs) | Potential silver (kg) | grade silver kg/ton |
|---------------|-----------------|----------------|-----------------------|--------|--------------------------|--------------------------|-----------------------|-----------------------|-------------------------|
| 1890-9 | 700 | [74] | 518 | | | [6.42] | 4494 | 127 | [0.18] |
| 1904-5 | 1120 | [74] | 828 | | | [6.42] | 7190 | 203 | [0.18] |
| 1905-6 | 238 | 74 | 176.12 | | | [6.42] | 1528 | 43 | [0.18] |
| 1906 | 877 | 80 | 701.60 | | | [6.42] | 5630 | 160 | [0.18] |
| 1907 | 919.31 | 73 | 735.45 | | 60.6 tons = 29 tons | 3.32 | 3048 | 86 | 0.094 |
| | | | | [48] | | | | | |
| 1908 | 988.24 | 73 | 721.41 | | | 8.19 | 8099 | 229 | 0.232 |
| 1909 | 778 28 | 75 98 | 583.50 27.44 | 55 | 116 tons = 64 tons | 8.92 | 7190 | 196 | 0.252 |
| 1911 | 24.50 | 76 | 18.62 | 41 | 30.5 tons = 12.5 tons | 11.06 | 271 | 8 | 0.315 |
| 1912 | 152.05 | 77 | 117.08 | | | 5.86 | 892 | 25 | 0.166 |
| 1921 | 81.24 | 76 | 61.74 | | | [6.42] | | 15 | [0.18] |
| 1922 | 22 | 69 | 15.18 | | | 1.18 | 26 | 0.73 | 0.033 |
| 1923 | 48 | 76.63 | 36.78 | | | [6.42] | | 9 | [0.18] |
| 1924 | 82.74 | 71.27 | 58.97 | | | [6.42] | | 15 | [0.18] |
| 1925 | 3.83 | 91.12 | 3.49 | | | | ? | | ? |
| 1926 | 20.97 | 99.51 | 20.87 | | | | ? | | ? |
| 1927 | 23.5 | 99.50 | 23.38 | | | | ? | | ? |
| 1937 | 65 | 78.80 | 51.22 | | | | ? | | ? |
| 1938 | 55 33.32 | 54.55 99.40 | 30.00 33.12 | | | [6.42] | ? | 10 | [0.18] ? |
| Totals | 6 333 tons | ave 74% | 4 762 tons | | 105 tons | ave grade = 6.42 ozs/ton | 19 526 | 1127 kg | ave grade = 0.18 kg/ton |

¹ Archive of H Eckstein & Co Ltd. Volume HE 234, file 71E Edendale no 1, 19 March 1903.

² Council for Geoscience, Pretoria, PH Allport, 'Lead Production of the Union of South Africa', Report no. 1940-0070, 1940, pp 12-13.

From the tonnages of lead ore mined and assay values for lead and silver it was possible to calculate the actual tonnages of lead produced. The known assay values of lead were averaged over the twelve known values, all of which were generally around 75% and excluding the obvious smelted lead values of around 96%. The average grade was calculated as 74% and shown in []. This value was used to produce likely values for 1890 to 1905. As only six values of silver are stated in Allport's report, an average value of silver per ton was calculated from the six known values (1907-1922). The calculated value is 6.42 ozs/ton or at 0.182 kg/ton silver. This value was used to extrapolate the possible values for silver in kilograms.

Note that the years shown above reflect only the years with production, not the total number of years in operation and development. The high values for lead - at approximately 98% - have to be for smelted matte values and the five entries are excluded in calculating the average for mined ore. However, the values would have resulted in good quantities of silver, if the grade of 6.42 kg/ton for ore is used, the potential for silver should have realized about 27 kg. Such values have not been included in the calculations. No values of silver/ton are known for the zinc ore, even though it would have contained some values of silver, but no values have been entered in the table.

Willows mine

The Willows mine, as the history detail shows, produced both high-graded ore that was shipped overseas for processing in 1889-1890 and smelted copper-matte.^{3 & 4} In late 1890 two furnaces were brought into operation and they smelted the ore to produce copper matte or smelted metal, in effect copper metal alloyed, in the case of the Willows mine, with antimony and high levels of silver. The smelting operation only lasted for a period of about six months and appears to have been plagued by the incompetence of the smelter operators. Through the use of monthly reports in the *Standard and Diggers' News* the author has been able to produce the table below which gives some idea of the amounts of ore mined and copper matte produced along with the values of antimony and silver. Using the assay values of the matte it has been possible to obtain average grades of copper and silver and use these averages to calculate tons of copper and kilograms of silver produced. The surprise was the high amount, potentially, of silver that the mine produced. The four quotes below are taken from the *Standard and Diggers' News*:

16 February 1891:

One furnace was running 30 days. 124 tons 1 900 lbs (125 tons) of ore were smelted, containing 4 465 ozs silver and 9 215 lbs copper. The amount of copper matte obtained 7 tons 1 212 lbs, containing 3 887 ozs silver and 8 760 lbs (3.91 tons) of copper. No 2 furnace has been delayed but this furnace should be fired before the end of February.⁵

³ First half-yearly Company report of the Willows Copper (Argentiferous) Syndicate, 1 July 1889, Harold Strange Library, Johannesburg Public Library, Johannesburg,

⁴ CS Goldman, *The Financial, Statistical and General History of the Gold and other Companies of Witwatersrand, South Africa*, p. 259.

⁵ 'Willows Mine Pretoria', *Standard and Diggers' News*, 16 February 1891.

19 March 1891:

One furnace was running 28 days, 115 tons of ore were smelted containing per assay 5 300 ozs of silver 11 660 lbs copper. Matte obtained: 8 tons 830 lbs, containing per assay 4 343 ozs silver and 9 784 lbs copper.⁶

18 April 1891:

Ore smelted 191 tons, containing per assay 7 624 ozs silver, 14 896 lbs copper, matte obtained 267 cwt containing 6 460 ozs silver, 14504 lbs copper, In consequence of the continued rains the returns will not be as good as expected. No 1 furnace running well.⁷

30 May 1891:

181 tons of ore were smelted and 140 cwt matte obtained containing, per assay, 3 797 ozs silver and 8 361 lbs of copper...The furnace chimney has become totally unsafe, so propose blowing out the fires and putting down stock, and during re-erection dress ores for shipment.⁸

Table 2 - Willows mine showing sourced (red) and calculated figures (black) for the production of copper and silver

| Date | Source as per footnote number | Copper ore (tons) | grade copper % | ore assay – copper potential production (tons) | grade silver ozs/ton | ore assay – silver potential production (ozs) | matte produced (tons) | matte copper % | Potential copper produced (tons) | matte silver assay ozs | silver in ozs/ton of matte | silver kg/ton matte | potential silver produced kg |
|---|-------------------------------|-------------------|----------------|--|----------------------|---|-----------------------|----------------|----------------------------------|------------------------|----------------------------|---------------------|------------------------------|
| High graded ore shipped overseas | | | | | | | | | | | | | |
| Jun 1890 | 1 | 5 443 | [3.9] | [212] | [39] | [212 277] | | | | | | | [6018] |
| Dec 1890 | 1 | 6 220 | [3.9] | [243] | [39] | [242 588] | | | | | | | [6877] |
| Smelted copper matte values | | | | | | | | | | | | | |
| Dec 1890 | 2 | [92] | [3.9] | [3.58] | | | 5.55 | [53] | [2.96] | [1525] | [515] | [146] | [810] |
| Jan 1891 | 3 | 125 | 3.3 | 4.11 | 36 | 4465 | 7.54 | 52 | 3.91 | 3887 | 516 | 146 | 1102 |
| Feb 1891 | 4 | 115 | 4.5 | 5.21 | 46 | 5300 | 8.37 | 52 | 4.37 | 4343 | 519 | 147 | 1231 |
| Mar 1891 | 5 | 191 | 3.9 | 7.38 | 34 | 6460 | 13.35 | 55 | 7.36 | 6460 | 484 | 137 | 1831 |
| Apr 1891 | 6 | 181 | [3.9] | [7.06] | | - | 7.00 | 55 | 3.85 | 3797 | 542 | 154 | 1077 |
| Total | | 12 367 | ave 3.9 | 482 tons | ave 39 | | 41.81 | ave 53.5 | 24.44 tons | 18 487 | ave 515 | ave 146 | 18 946 kg |

⁶ 'Willows Copper (Argentiferous) Syndicate', *Standard and Diggers' News*, 19 March 1891.

⁷ 'Willows Copper Synd', *Standard and Diggers' News*, 18 April 1891.

⁸ 'Willows Copper', *Standard and Diggers' News*, 30 May 1891.

No official production figures have been found in government records. In extrapolating the potential production of copper and silver from the high-graded ore shipped overseas, the figure of 3.9% as the grade for the copper and 40 ozs per ton for the silver are based on the average assay values for the ore used in the smelting operation from January – March 1891. It is possible that the hand-sorted ore that was shipped in 1890 was of higher grade, but it is not possible to know what the grades may have been. The values used provide some indication of the potential production from the Willows mine in the 1890s. It is known that there was a high percentage of antimony in the ore, especially as the development went to a third level. It is difficult to produce a potential production of antimony because of the wide variances in grade from 2 – 20%. If the lower value is used however, then the potential production or recovery was 245 tons. The possible production of 18.95 tons of silver makes the Willows mine the second largest producer of silver after the Transvaal mine at Argent.

Argent mines

Developing production output figures for the mines at Argent has been problematical for several reasons. Firstly lack of official figures for the 1890s has meant a re-creation of output data that is based on company reports similar to the exercise with the Willows mine. Output for the period from 1903 to 1938 is covered in Allport's report of 1938 and production outputs for the 1950s are based on internal reports of the Goldfields Group. No production took place in the 1970s on any of the Goldfields Group options. There is a difference in the terminology of the output of smelted metal from the Willows mine, that produced silver rich 'copper matte', and the Argent mines that produced silver rich lead 'bullion,' and 'lead matte' In essence, however, they are very similar in that a dominant element - copper or lead - contained significant percentages of silver.

The table below was developed as the first comprehensive table of tonnages mined/smelted and of lead bullion produced, coupled with potential outputs of the major metals - lead, zinc and silver. For the first time, the tonnages of 1890s are calculated and combined with the post-1900 production figures. The sources for the 1890s are the figures presented in the company reports that were found as part of the Archives of H Eckstein & Co in the Barlows Archives. The 1900-1927 records are sourced from Allport's 1938 report and the company reports of the Transvaal Silver and Base Metals Ltd. The 1950s figures are developed from the manager's reports of the Argent Lead and Zinc Co Ltd, a subsidiary of Goldfields of South Africa and the details, although sketchy, were found in the Goldfields' files.

An additional complication was defining which mining operation the ores came from. It is almost certain that the 1890s ores were derived from the 'main mine' at Argent (Dwarsfontein) of the Transvaal mine. However, in the 1920s period of the Transvaal Silver and Base Metals mine - although the main operation was clearly at the 'main mine' or Transvaal mine - it is not clear how much of the ore was derived from Boschpoort, Brakfontein, the Shimwell Lode and possibly other small operations that the company investigated in the early years of the 1920s. During the 1950s Goldfields certainly dewatered various old mines, but it is believed that they only mined ore from the Brakfontein mine. Their main goal was the

development of zinc deposits and it is clear from the mineralogy that only the Brakfontein mine provided such economic potential for zinc minerals.

Table 3 – The Argent mines, showing sourced (red) and calculated figures for the production of lead, zinc and silver at the Argent mines – Boschpoort, Brakfontein, Transvaal and possibly the Pretoria mine both on (Dwarsfontein) in the 1920s.

| Month/ Year | See sources below | Ore produced (tons) | Concentrates shipped | High grade ore shipped (tons) | Bullion shipped (tons) | Assay grade lead (%) | Potential output of lead (tons) | Assay grade of copper or zinc (%) | Potential output of copper or zinc (tons) | Assay grade silver (ozs/ton) ^h | Potential output of silver (ozs) | Potential output silver (kg) |
|---|-------------------|------------------------|---------------------------------------|----------------------------------|---------------------------|-------------------------|------------------------------------|--|---|--|-------------------------------------|---------------------------------|
| Nov 1889 | 10 | ? | | 25 | | 50 | 12.5 | | | 75 | 1875 | 53 |
| Dec 1890 | 11 | 2000+ | | 176 | | 69 | 121 | 1 | 1.8 | 90 | 15840 | 449 |
| Dec 1891 | 12 | 8000+ | | 767 | | 72 | 552 | 1 | 5.5 | 91 | 69797 | 1979 |
| Dec 1892 | 13 | 13670 | | 457 | 363 ^a | 72 | 329 359 | 1 1 | 4.6 3.6 | 74 74 | 33818 26862 | 959 761 |
| Dec 1893 | 14 | 7739 | 695 ^b | 693 | 376 ^a | 72 72 72 | 500 499 372 | 1 1 1 | 6.9 6.9 3.7 | 74 74 74 | 51430 51282 27824 | 1458 1454 789 |
| Dec 1894-5 | 15 | 29517 | 4364 ^b | | | 72 | 3142 | 1 | 43.6 | 74 | 32293 | 9155 |
| Sub-totals 1889-1894 | | 60926 | 5059 ^b | 2112 | 739 | | 5886 | | 77 | | 311021 | 17057 |
| 1901 | 16 | | | {538} ^c | | | | | | | | |
| 1908 | 17 | | | 133 | | 60 | 80 | | | 63 | 5044 | 143 |
| 1912 | “ | | | 267 | 450 ^d | 50 12 20 | 133 54 251 | | | 26 | 51788 | 1468 |
| 1913 | “ | | 1254 ^e 395 ^e | | | 20 | 79 | | | 22 | 8690 | 246 |
| Sub-totals 1901-1913^f | | | | 400 | 450 | | 597 | | | | 65522 | 1857 |
| 1919 | “ | 465 113 | | | | 25 64 | 116 72 | 1 1 | 4.7 1.1 | 26 70 | 12106 7943 | 343 225 |
| 1920 | “ | 264 | | | | 25 | 66 | 1 | 2.6 | 58 | 15487 | 439 |
| 1921 | “ | | | 94 | | 98 | 92 | 1 | 0.9 | 98 | 9266 | 263 |
| 1922 | “ | | 24 | 22 ^g | | 55 56 97 | 12 13 4400 | 1 1 | 0.2 45.4 | 40))379041 | 880))10746 | 250))10746 |
| 1923 | “ | | | | 5440 | 97 | 5277 | 1 | 54.4 | 89 | 485848 | 13774 |
| 1924 | “ | | | | 4921 | 97 | 4773 | 1 | 49.2 | 94 | 463096 | 13129 |
| 1925 | “ | | | | 1840 | 74 | 1362 | 1 | 18.4 | 123 | 227216 | 6441 |
| Sub-totals 1919-1925 | | | 24 | 116 | 16737 | | 16183 | | 177 | | 1600883 | 45385 |
| 1955 | 18 | 16300 | | | | 3.61 | 588 | 5.4 | 880 | 4.57 | 74491 | 2112 |
| 1956 | 18 | 43500 | | | | 3.94 | 1713 | 5.06 | 2201 | 4.88 | 212280 | 6018 |
| Sub-totals 1956-1956 | | 59800 | | | | | 2301 | | 3081 tons | | 286771 | 8130 |
| Totals 1889-1956 | | | | | | | 24 967 tons | copper = 254 tons zinc = 3 081 tons | | | 2264197 ounces | 72 429 kg |

Table 4 sources

- ¹⁰ Harold Strange Library, Johannesburg Public Library, Johannesburg, Transvaal Silver Mines Report to Directors of Transvaal Silver Mines by WH Furlonge, 26 November 1889.
- ¹¹ Archives of H Eckstein & Co Ltd Volume HE 5, Annexure 17 & 18, Report to 2nd AGM of shareholders, 9 April 1891. The tonnage of 176 tons represents the total shipped overseas for treatment between October 8th and December 31st 1890. The 2000 tons represents the amount of unsorted ore on surface at the time of the annual report. The values in the table are the values given in the source and represent the potential returns from the 176 tons only.
- ¹² Archives of H Eckstein & Co Ltd Volume HE 5, Annexure 19-20, Chairman's report to 3rd AGM of shareholders, 21 April 1892.
- ¹³ Archives of H Eckstein & Co Ltd Volume HE 5, Annexure 22, Chairman's report to 4th AGM of shareholders, 9 March 1893.
- ¹⁴ Archives of H Eckstein & Co Ltd Volume HE 5, Annexure 23, Chairman's report to 5th AGM of shareholders, 29 March 1894. Note the shipment of three products – high grade ore, concentrates and lead bullion. The grades of lead and silver are given in the report.
- ¹⁵ Archives of H Eckstein & Co Ltd Volume HE 5, Annexure 24, Chairman's report to 6th AGM of shareholders, 14 November 1895.
- ¹⁶ 'Pretoria Silver, Lead and Copper Mines', *The South African Mining Journal*, (19 September 1908), p. 684. The production of ore during the period of the Anglo-Boer war is doubtful and although the source states 1901 the use of the data is questionable and it has not been added to the sub-total. It is believed that it may have been a typographical error and the correct date was more likely 1891.
- ¹⁷ Council for Geoscience, Pretoria, PH Allport, 'Lead Production of the Union of South Africa', Report no. 1940-0070, 1940, p. 15.
- ¹⁸ Gold Fields of South Africa file ARG820/1/1 BRAK - A review of the main factors concerning the opening up of the mine, the operating results obtained and the effects of metal price variations, Report by LD Browne, consulting engineer, 10 September 1957, p. 3.

The production figures for Transvaal Silver Mines Ltd 1890 -1895

The mine was effectively in production for about 5 years. During that time it switched from shipping high-graded ore to ore plus bullion to concentrates only. No details have been found of any form of consolidated production figures for TSM. Using details from the AGM reports between 1890 and 1895 table 4 above was produced.⁹

As the mine stopped operation early in 1895, the figures for 1894 and part of 1895 were consolidated in the 1895 AGM report. It has been impossible to separate the production figures of Transvaal mine from those of Boschpoort and Brakfontein. The only figures that are almost certainly from the Brakfontein mine are the 1955-56 figures, which indicate values of zinc.

⁹ Archives of H Eckstein & Co Ltd Volume HE 5, Annexure 17-24, 9 April 1891 – 14 November 1895.

Table notes:

The assay grade for silver in ounces per ton shown above for the period between 1908 and 1925 are derived values. They are based on the stated ounces of silver produced and the ore and concentrates produced. It must be stated that the values are a very general guide to the grade per ton silver. As the actual amount of ore raised during this period could not be determined from any of the sources, the values of silver are most probably inflated, but they do generally correlate with known values from the 1890s. In creating the table of values certain assumptions have been made. In the period 1889-1896 it has been assumed that the values of lead and silver are based on concentrated values rather than the average value of raised ore per ton. If the latter was used – 60 926 tons - as the basis for the calculation of potential lead and silver produced, the derived values would be considerably higher and possibly false. The only instance where the ore raised has been used is in the 1955-56 values. A problem exists with the 1920s figures in that no records of amounts of ore raised have been found. For four years the ore was concentrated and smelted into lead bullion. No figures of the ratio of raised ore to bullion have been found and it is impossible to determine the amount of lead and silver per ton of ore. It is known what the outputs in terms of silver (ounces) and lead (tons) were. The copper averaged 1% and this value has been used to calculate a potential minimum tonnage.

General notes:

- a. Amount in parenthesis { } for 1901, see note 16 above.
- b. The source states that the production was of 450 tons of lead matte. This can be described as the first smelt of the metallic sulphides from the ore.
- c. The two amounts are described in the source as lead slime. This represents a product recovered from previous concentration operations.
- d. It should be noted that although there were several companies or syndicates in operation during the period 1908-13, none of them were involved in development or underground mining operations. They were only involved in surface recovery of ore and processing by-products such as lead slime or matte.
- e. While the value or grade of the ore is known from the analysis in the source, the source does not state the value of silver per ton of bullion. In order to determine a minimum potential production of silver, the assay value of silver per ton of ore at 74 ozs per ton (0.219 kg per ton) has been used.
- f. In the 1894 Chairman's report to the 5th AGM of shareholders page 6 it states that concentrates assay at 72% lead and 74 ozs of per ton silver.
- g. The only known individual amount of high graded ore recovered from the Shimwell lode.

Appendix 4

General Manager's (Otto Hahn) report to the third Annual General Meeting, April 1892.¹⁰

To The Directors of the Transvaal Silver Mines, Ltd., Johannesburg.

Dwarsfontein, April 8th, 1892

GENTLEMEN, ---

Pursuant to your instruction of April 1st, your General Manager has the honour to submit to you the following Report on the operation carried on during the last fiscal year at that part of your property under his immediate personal supervision.

During my first visit to the Transvaal Silver Mines, one year ago, the outlook of the West Lode and the appearance of the ore on the dump, as also the commercial status of the lead and silver market, fully warranted the erection of the Reduction Works as recommended by Mr. H. Jennings, and it was decided to order immediately two blast furnaces of a capacity of 40 tons of ore per diem each, with the necessary auxiliary machinery. In view of the large percentage of fines produced by the shattering action of the dynamite used in the mine, and the probable prospective increase of zincblende (black jack) in the ore, I deemed it necessary to embody the erection of two reverberatory roasting furnaces in the reduction plant.

The lack of accommodation at the mine and the difficulty of communicating with Johannesburg compelled me to return to the latter place to work out my plans in all their details. The orders for supplying the plant were divided between the representatives of two prominent engineering firms, who rendered me valuable assistance. For the sake of ensuring speed in executing the orders, it was decided to get the castings for one blast furnace, the roasting furnaces and a number of auxiliary apparatus made in England, while boilers, machinery, and the second blast furnace were ordered from America, where most essential articles used in the installation of smelting works are usually kept in stock. The last orders were sent off in June.

The most vexing problem for our smelting enterprise has been the question how to obtain suitable domestic coke at reasonable rates. It is not in the province of a smelter to manufacture all the materials he requires himself, otherwise he might become entangled so much in foreign matters as to lose sight of his principle business. Nevertheless an experimental beehive-oven was built by the writer upon taking up residence at the Mines, in July last, and a number of coking tests carried out on coals obtained from the neighbouring collieries and coal farms. The results were all of a negative nature [report edited at this point].

The site of the Reduction Works was located by Mr Jennings and the writer on the 21st of July, at a distance of 700 yards to the north-east from the Main Shaft. Grading was commenced soon after, and stone foundations laid for two tall chimney-stacks, one for the roasters, and one for the smelter, as soon as the Company's quarry was cleaned out and put in shape for furnishing building stone. An attempt was made to get the material for the Roaster Shed out during the winter season, so as not to lose too much time; but it was only successful in regard to the lumber and galvanised iron, which were purchased in Johannesburg and delivered here in August. The arrival of the iron-work for trusses and girders was delayed till the opening of the transport season, and retarded the commencement of framing till the middle of October. The Roaster Shed, which occupies an area of 84 x 100 ft., was completed late in November, and used as a drying shed for green brick, and, later on, to protect the lumber and other material for the Smelter from atmospheric influences.

In the meanwhile the General Manager's Office and Residence had been finished, and the workmen's quarters enlarged, so as to afford room for the accommodation of 48 white men. Additions to the Kaffir Compounds were also rendered necessary from time to time. A new dynamite magazine had to be built, as the old one was in too uncomfortable a vicinity for the Smelting Works. A new and spacious Assay Office and Laboratory was also built, but it is not in operation yet, owing to delays for which the writer is only partially responsible. The waste of brick burnt in the ordinary open field-kiln was so large that it was considered advisable to build a brick-kiln, with stationary fire-places, which gives better satisfaction in every respect.

The first consignment of castings from England was received from Charleston, on the 15th of December, the lumber for the Smelter Buildings soon after, and the first consignment of machinery from America on the 30th of December. The last lot of machinery and castings arrived on the 31st of March. The Engine and Boiler House is finished in the rough, and the framework of the Crusher Shed and Blast-Furnace Shed up. The boilers are set up and walled in, the engine, heater, and line shaft are in place, so is the crusher. Cornish Rolls and Blowers are ready to be put in place. I expect to be able to begin operations by the end of May.

The Plant will consist of the following parts:-

A. *Roasting Department.* -- Two reverberating roasting furnaces, with step-grates and fuse box, 75ft. x 17ft., outside dimensions, which will terminate in a flue 5ft. wide by 6ft. high by 70ft. long; this flue connects with a condensing chamber, 20ft. by 25ft. by 12ft., and through this with a chimney 60ft. high by 3ft. 4in. diameter, resting in a base 12ft. high. Flue and base are built, and the foundations for the furnaces laid. The object of these furnaces is to desulphurise the zincy ores, and convert fine ores which would otherwise obstruct the blast furnaces into a slag, a more convenient shape for the latter.

¹⁰ Archives of H. Eckstein & Co Ltd. Vol. HE 5, Annexure 19. General Manager's report to 3rd AGM of shareholders. 21 April 1892.

B. Crushing Department. -- This consists of a Blake Crusher, 15in. x 9in. opening of jaw, one set of geared Cornish Rolls, 26in. diameter by 12in. face, and one sample grinder. The crusher breaks large lumps of ore to a convenient size for the blast furnaces, and for the Cornish Rolls. It also breaks limestone, iron ore, and slag, to size required in blast furnace. The Cornish Rolls grind ore to the proper size for roasting furnaces, and for the sample grinder. They also serve to grind fire-clay, matte, and other material which is desired in pulverulent form. The sample grinder prepares the ore or other samples which have primarily passed through the crusher and rolls for the bucking table at the Assay Office. Size of building, 24 x 40 ft.

C. Machinery Department -- Two tubular boiler, of Fraser and Chalmers' manufacture, 4ft. 6in diameter by 16ft. long, with heaters, mud-drums and funnel 70ft high, furnish the steam to a No. 4 Knowles feed pump, A Blake service or fire pump, and a 14in. x 42in. Fraser and Chalmers' Corliss engine, which furnaces the motive power to two Baker Blowers, No 5½, one Reedy's double platform elevator, of 200 lbs. Capacity, and the crushing machinery. To assure safety in handling the machinery, loose pulleys and belt tighteners have been attached wherever necessary. The feed-water for the boilers is passed through a 24in. tubular heater before entering them, and may be taken either from a water tank at the back of the Smelter Building, to which the water is piped from the storage-tank at the Mine, or from a reservoir or dam in front of the engine-house, 50ft. x 89ft. x 7ft. 10in., which receives its supply by a ditch from the overflow at mine tank. All waste water from the Smelter will be collected again in this dam.

The building containing boilers and machinery occupies a space of 37ft. 3in. x 96ft. 9in.

D. Blast-Furnace Department -- A separate building, 12 feet apart from the preceding one, will contain two water-jacketed blast furnaces of the most approved pattern, such as I have used at the various works of the Consolidated Kansas Smelting and Refining Company, in America. One of these furnaces has been made by the Sandycroft Foundry, and is a model of good workmanship. The furnaces are of the open-top or cut-off kind, with no superstructure above the charge floor. The fumes will be drawn off below the charge floor through a wrought iron tube, 3ft. in diameter, which will connect with a brick flue, 8ft. wide and 8ft. high, and 50ft. long, terminating in a dust chamber 25ft. x 32ft. x 12ft., and through this with a chimney stack 100 ft high. The object of dust chambers and high chimneys is not generally understood by lays. I will therefore state that in America, in the early stages of smelting, hundreds of thousands of dollars have been puffed into the air for want of condensation chambers, and many a smelting camp has been converted into a perfect hell because the smelter fumes were not conducted high enough to become thoroughly diluted with atmospheric air, every gust of wind would blow them down and stifle the air. The smelting area of our furnaces at level of tuyeres, will be 3ft. 6in. x 8ft. 4in., and at top 5ft. x 8ft. 4 in. The height from the smelting floor to charge floor will be 22ft. 4in. They will be provided with 10 4in. openings for the tuyere pipes, which receive their blast through a 12in. supply pipe, from a 42in. main. The latter is 79ft. long, from end blower to release valve. The lead will be drawn off from the bottom of the furnace through an automatic tap, into a kettle, resting on a stove, from where it is ladled into moulds. After cooling, the bullion bars will be removed on trucks constructed for the purpose, sampled, weighed, stamped with shipping number, and stacked ready for shipping. The slag and matte will be drawn off through the slag-spout at furnace front, into cast iron pots, holding 380lbs. After cooling the contents of the pot, consisting of a solid cone, are emptied, the matte at the bottom of the cone is knocked off and saved for further treatment, while the slag is thrown away.

The flue dust, consisting of the finest particles of ore, flux and coke, and having about the same value as the original charge is collected in the flue and dust chamber. It is from time to time withdrawn through the working-doors, tempered with clay in a pug mill, moulded into bricks, and returned to the smelting charge when dry.

The ore and fluxes constituting the smelting charge and the coke used for its reduction are weighed up into trucks in a separate shed, where there are two platform scales, one for the ore and one for the fuel. The charge trucks are then run on the lift, hoisted to this charge floor, and emptied into the furnaces, which must be kept filled up to the top while running.

The size of the smelter building is 45ft. x 52ft. All freight arriving at the mines is weighed on a Fairbank's weigh-bridge of 10 tons capacity, with a 24ft. x 9ft. 6in. platform, which has proved a money saving institution.

The ore will be trammed from the mine to the smelter, and accurate samples will be taken during the loading of the trucks to control the smelting operations. The ore extracted from the west lode, lying to the east of the main shaft, has been assorted over and classified by me, the screenings giving the highest assay results. There is quite a large percentage of zinc in this ore, owing to the close picking of the shipping-ore. To the west side of the main shaft, where the present ore dump is located, about one-third of the smalls from the mine has been assorted and classified; the rough ore will be assorted during its removal to the smelter.

The ore struck in the east lode proved so refractory that it could not have been made available for smelting without machine dressing, and I therefore recommended to you the suspension of operations on the mine until some more opportune time, when dressing works will have to be called into requisition.

There is now a six months' supply of limestone, and sufficient English coke on hand to last until we can get the domestic coke contracted for.

Up to the present time the following buildings have been erected since your last report was issued, for all of which there was an urgent necessity: --

One general office, 48ft. 3in. x 52ft. 4in., built of wood and galvanised iron, with lining of burnt brick. It contains two offices, four bedrooms, one dining room, kitchen and servants' rooms, and is lighted in the evening with electric lights.

One assay office and laboratory, 44ft. 4in. x 32ft. 4in., built of sandstone, and having brick partition walls. Contains one balance room, one laboratory room with sand-bath oven, one assay room with water-bath oven, and two muffle furnaces, and one fire room with one crucible furnace. The ovens, furnaces and chimneys are all built of brick.

One dynamite magazine, 19ft. x 16ft., of sandstone.

One granary or mealie meal store, 41ft. x 22 ft., of sandstone.

One warehouse for supplies, 41ft. x 22ft. of sandstone; not quite finished inside.

One scale house attached to weigh-bridge, 17ft. x 13ft., of wood and iron, with lining of sun dried brick. Contains office of weigh clerk and bedroom for same.

One Kaffir hospital, with physician's dispensary, 33ft. x 19ft. 9in., of wood and iron, with lining of sun dried brick. Contains ward for six beds and two small rooms.

One cottage for chief fitter and family, 25ft. x 23 ft., of wood and iron with lining of sun dried brick. Contains one sitting room, two bedrooms, and a kitchen.

One brick kiln, 21ft. 10in. x 16ft. 3in. and 14ft. high, of stone and brick. Has a capacity of 22,000 bricks, which are baked in 50 hours.

One brick shed, 18ft. x 100ft., of wood and galvanized iron.

One cattle kraal, 102 ft. 6 in. x 54 ft. 4 in., of stone, for cattle and sheep.

One tool shed at reduction works, 11 ft. x 8 ft. x 7 ft., of wood and iron.

One oil-house at mine, 12 ft. x 10 ft. x 7 ft., of wood and iron.

One blacksmith shop at reduction works, 26ft. x 20 ft., of wood and iron, with one stone forge and brick chimney.

Three Kaffir compounds, each 29ft. x 23 ft. x 5 ft., of wood and iron.

One raster shed, 84ft. x 100ft., of wood and iron.

One engine and boiler shed, 96 ft. x 37 ft., of wood and iron.

One engine house at east lode, 59 ft. x 20ft. of wood and iron

One Kaffir compound at east lode 29ft. x 23 ft. x 5 ft. of wood and iron.

One blacksmith shop at east lode, 19 ft. x 14 ft. 9 ft., of wood and iron, with stone forge and brick chimney.

The addition to the white men's quarters was also constructed since. The boarding house is of wood and iron, and occupies an area of 175 ft. x 26 ft. It contains a dining hall, two rooms for boarding house attached, and 24 rooms for 2 workmen each. The rooms are all lined with brick, whitewashed, and provided with wooden ceiling and floor. The kitchen, which is separated from the dining-room by an open air space, is also of wood and iron, and is 22 ft. x 12 ft. x 10 ft. high.

Besides the buildings above enumerated, there are the following old ones: --

One cottage, 25 ft. x 23 ft. of wood and iron, brick lined, occupied by the mine manager and one clerk.

One engine house, 100 ft. x 30 ft. x 15 ft., of wood and iron, contains boilers, engines, fitter's room, and carpenter shop, and a grist mill in an annex.

One blacksmith shop, 30 ft. x 30 ft. x 15 ft., of wood and iron; contains two forges of stone with iron funnels.

One shed, 46ft. x 16 x 9 ft., of wood and iron; used for the storage of lime, cement, and other rough goods.

One meat house, 12 ft. x 8 ft. x 10 ft. of wood and iron, brick lined.

One house, 30ft. x 26ft. x 10ft., of wood and iron, partially brick-lined. Contained old assay office, shop, and mealie store, and will be turned into additional living quarters.

One building, 31 ft. x 28ft. x 10 ft. of wood and iron; contains one room occupied by groom, one stable and one store room. The latter will be turned into additional stabling room as soon as new warehouse is ready for occupancy.

One stable, 19 ft. x 16 ft. x 9 ft., of wood and iron, formerly occupied by boarding house keeper's horses, now by Company's coach horses.

One Kaffir house, 45 ft. x 12 ft. x 9 ft., and one 25 ft. x 15 ft. x 11 ft., both of wood and iron.

One warehouse near reduction works, 19 ft. x 15 ft. x 8 ft., of stone and brick. This used to be the dynamite magazine, but is now used for storing articles belonging to reduction works to prevent their misappropriation.

One cottage at east lode, 19 ft. x 17 ft. x 10 ft., of wood and iron, formerly occupied by employees at the mine, now vacant.

The Company has about 65 acres of ground under cultivation, mostly with mealies. The growing of vegetables is only a moderate success, the vermin getting the lion's share.

The working force under the mine manager consists of 17 white men, comprising miners, engine-drivers, tool-sharpeners, carpenter and smith, and 200 or more natives.

At the reduction works there are employed :--

1 construction engineer,

3 fitters,

8 carpenters,

1 blacksmith,

4 masons,

3 bricklayers,

And, in connection therewith, at ore floors, brickyard, clay-pits, and quarry :--

13 additional white men.

Total 33 white men and 120 natives. The official staff consists of four clerks.

The health of the men has not been so good as the salubrious climate of this region would lead one to expect, yet only one case of serious illness has come under my notice, viz., one of typhoid fever. There have been two deaths among the white men from natural causes, one of heart disease, and one of consumption. Among the natives pneumonia seems to prevail to a large degree, and there have been six deaths as a consequence of it. Of accidents there are fortunately only two to record, one to a white man who was struck by a loose rock while timbering the shaft, and one to a native, neither of a fatal nature but both expensive to the Company.

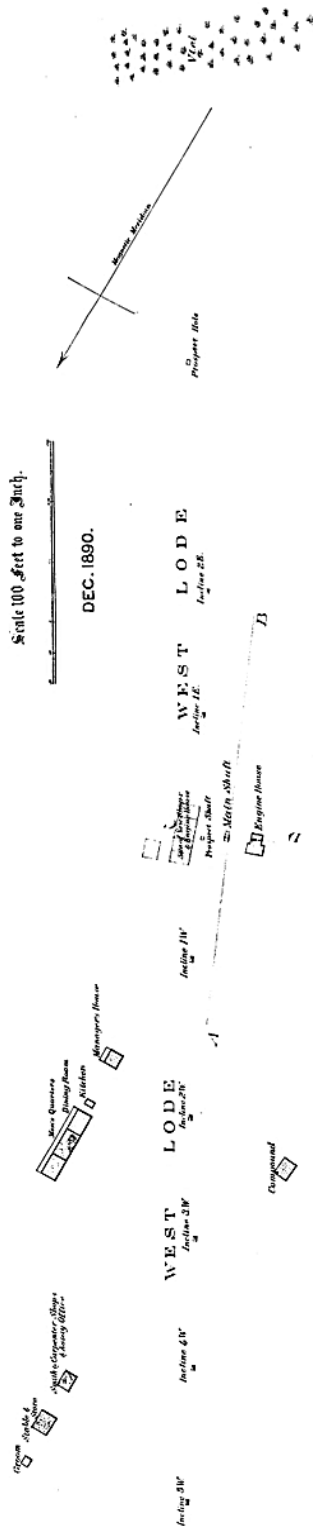
Nobody regrets the non-completion of the reduction works before the annual general meeting more than I do, but considering the tardy arrival of material, you can judge for yourselves whether this was possible. I shall try my best to be ready by June 1st or sooner.

TRANSSVAAL SILVER MINES

PLAN OF THE WORKS

Scale 100 feet to one Inch.

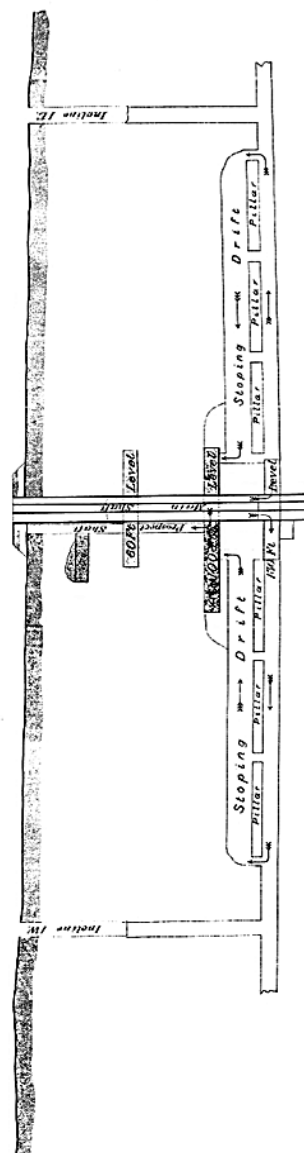
DEC. 1890.



LONGITUDINAL SECTION ON LINE A.B.

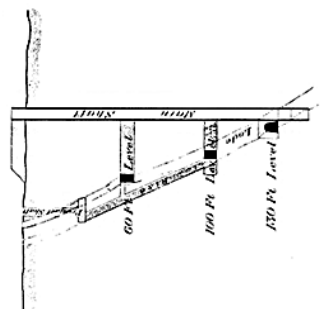
Scale 50 feet to one Inch.

*Note: Black lines show work done
Red lines show proposed
method of mining
Red arrows show direction
of air currents*



CROSS SECTION ON LINE C.D.

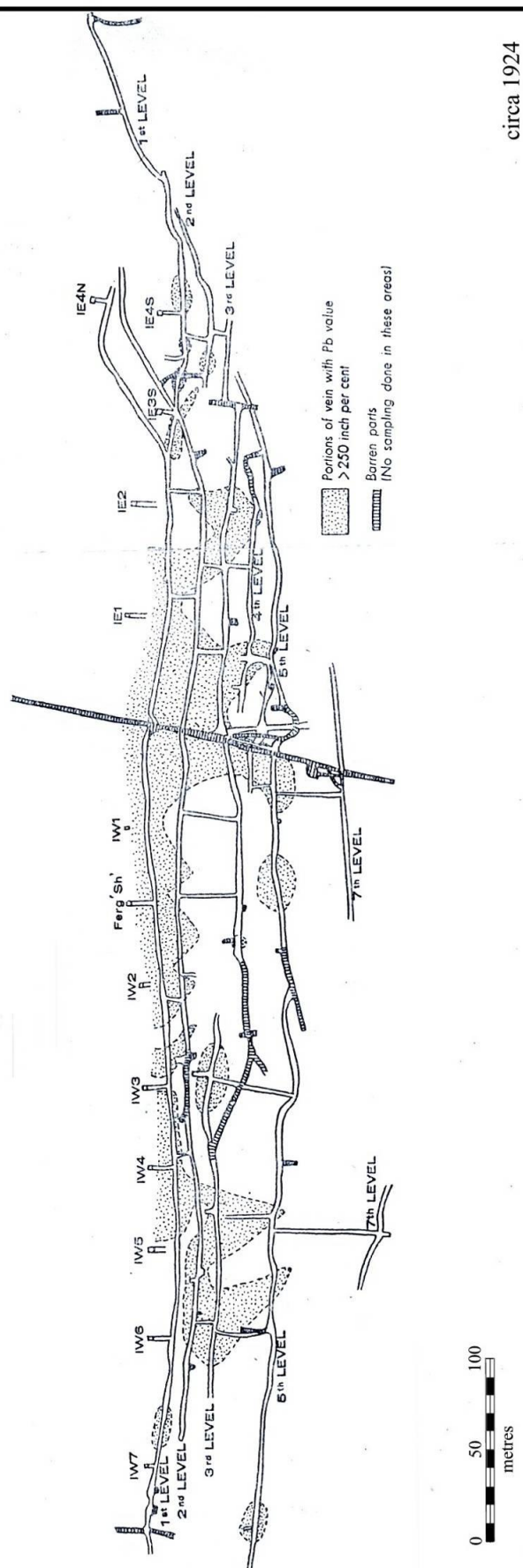
Scale 50 feet to one Inch.



Appendix 5

1890 mine plan
of the Transvaal
Silver Mines
Ltd,
Dwarsfontein
209IR

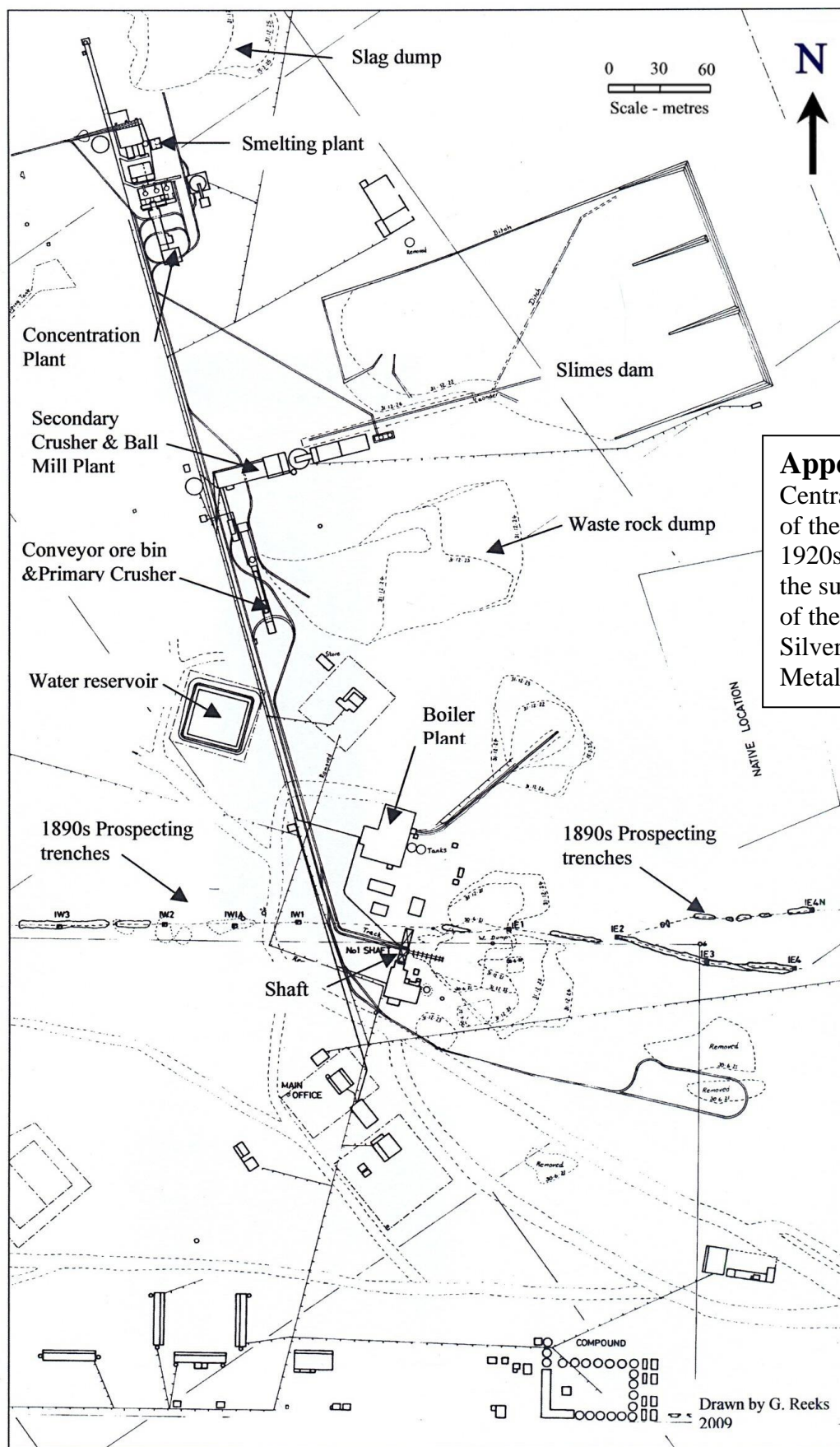
TRANSCAAL SILVER AND BASE METALS LTD
UNDERGROUND PLAN OF THE NUMBER 1 SHAFT



Appendix 6

Transvaal Silver
 & Base Metals Ltd
 – underground
 plan, circa 1924

Source: Willemse, J, et al.,
*Lead Deposits in the Union of
 South Africa & South West
 Africa with some notes on
 associated ores*, Memoir no 39
 (Pretoria: Geological Survey,
 1942).



Appendix 7
Central portion
of the re-drawn
1920s plan of
the surface plant
of the Transvaal
Silver and Base
Metals Ltd mine

Appendix 8 – Conversion of Imperial to metric mass and distance units

It is not possible to give conversions for all of the distances and masses cited in the text. The following table of conversions are designed to give the reader a quick conversion guide or the means to calculate the metric unit if so desired.

Length in Imperial units is feet and in metric units are metres (m). 1 foot (12 inches) = 0.304 m.

| <i>Feet</i> | <i>Metre</i> |
|-------------|--------------|
| 1 | 0.3 |
| 5 | 1.5 |
| 10 | 3 |
| 30 | 9 |
| 50 | 15 |
| 100 | 30 |
| 200 | 60 |

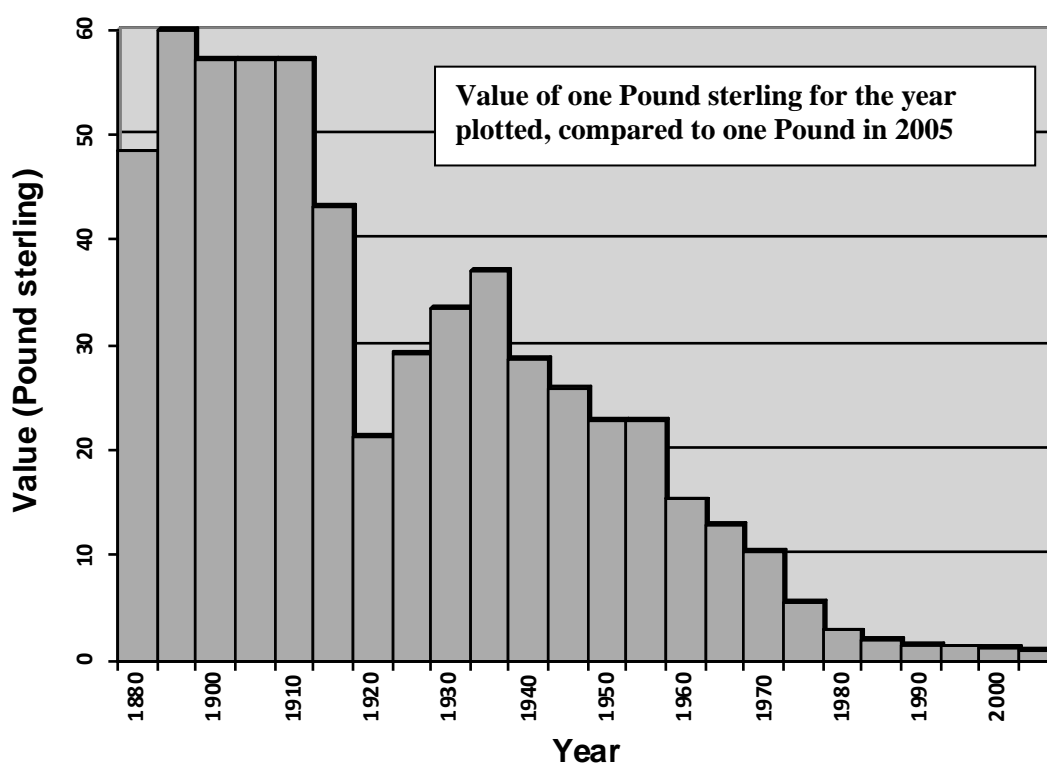
Mass in Imperial units is ounces (ozs) or pounds (lbs) and in metric units are grams (g). 1 ounce = 28.35 grams and 16 ounces = 1 pound with 2240 lbs = 1 long ton or 1 metric ton (1000 kg).

| <i>Ounces</i> | <i>Grams</i> |
|---------------|--------------|
| 1 | 28.35 |
| 5 | 142 |
| 10 | 283.5 |
| 30 | 850.5 |
| 50 | 1420 |
| 100 | 2835 |
| 1 lb | 453.6 |

Appendix 9

Conversion table of one pound sterling in the year shown to a value in 2005

| Year | Value | Year | Value |
|------|-------|------|-------|
| 1880 | 48.31 | 1950 | 22.78 |
| 1890 | 59.89 | 1955 | 22.78 |
| 1900 | 57.06 | 1960 | 15.30 |
| 1905 | 57.06 | 1965 | 12.86 |
| 1910 | 57.06 | 1970 | 10.28 |
| 1915 | 43.06 | 1975 | 5.57 |
| 1920 | 21.21 | 1980 | 2.85 |
| 1925 | 29.97 | 1985 | 2.01 |
| 1930 | 33.42 | 1990 | 1.51 |
| 1935 | 36.98 | 1995 | 1.28 |
| 1940 | 28.72 | 2000 | 1.12 |
| 1945 | 25.95 | 2005 | 1.00 |



The value of the pound sterling has changed dramatically since 1880. In order to calculate the relative value of an amount quoted in the dissertation look at the value for the year or nearest year and multiply the value by the figure stated above. The source only provides conversion factors to the year 2005.¹¹

For example £35 000 in 1890 is the equivalent of $35\,000 \times 59.89 = £2\,096\,150$ in 2005.

¹¹ <http://www.nationalarchives.gov.uk/currency/default1.asp#mid> accessed on 30-11-2011.

Appendix 10 Photographic collection of selected artefacts from the excavations at the Transvaal mine.



Fig. 1 Glass inkpot
DWA209IR/M11//G1.



Fig. 2 White-bodied industrial ware - part of a saucer
DWA209IR/SPOU//C1.

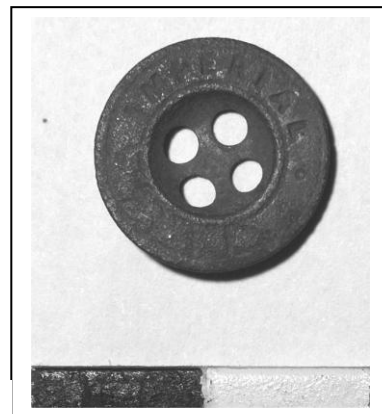


Fig. 3 13.5 mm diameter brass button with word IMPERIAL on rim. # DWA209IR/U8/c3/MO2.

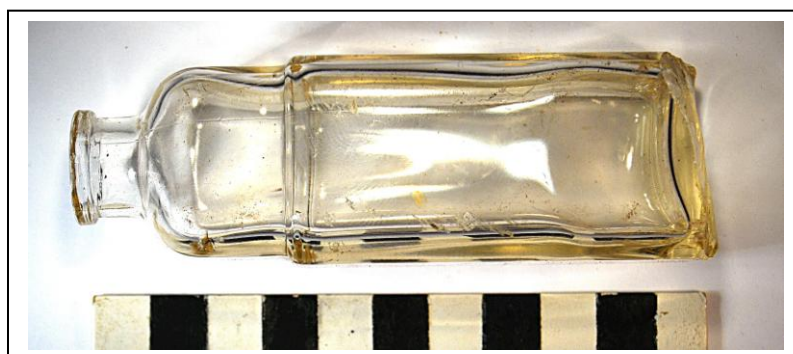


Fig. 5 Square glass bottle. It most probably had a cork stopper. # DWA209IR/F10//G1.

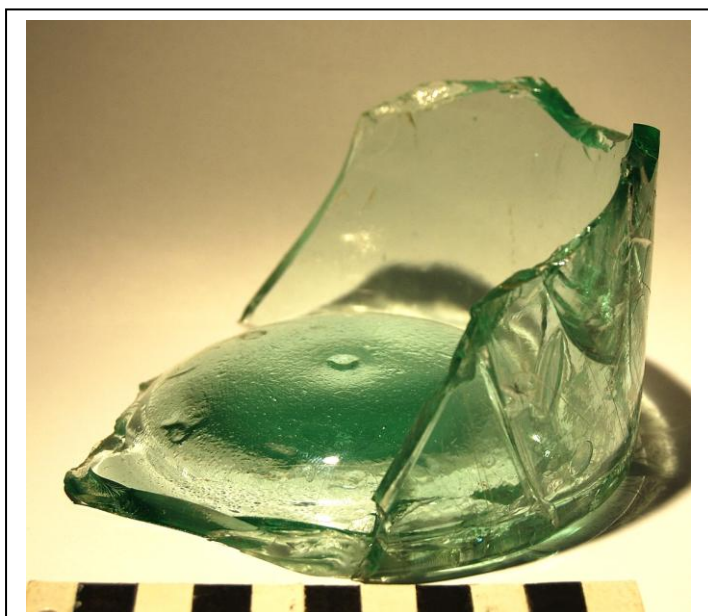


Fig. 4 Reconstructed green glass vessel with thick bell bottom
DWA209IR/Q8/a8/GF16.

Note the numbers are the artefact reference numbers. Scale is cm divisions.



Fig. 6 Hand-forged nails with square shanks # DWA209IR/F10//MO5.



Fig. 7 Opaque glassware rim with painted pattern –unglazed, possibly part of tea cup. DWA209IR/SPO//DC2.



Fig. 8 Part of a magenta ware cup or bowl. # DWA209IR-R8-j8-DC1.



Fig. 9 Tapering steel with a round ground tip and broken opposite end. It may represent the broken pick point of a poll-pick – used by miners to knock wooden props into place. # DWA209IR/F10//MO6.

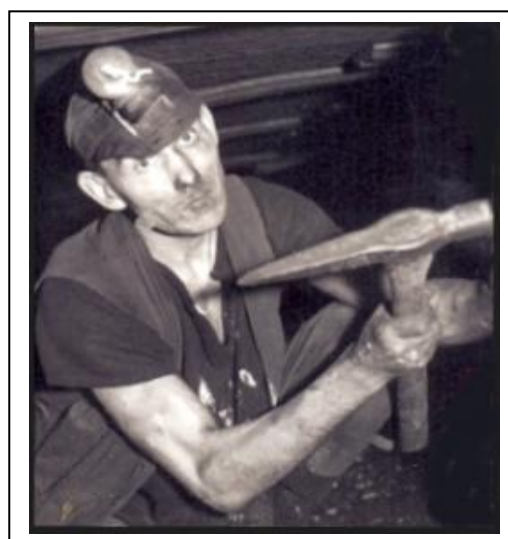


Fig. 10 Poll-pick in action. Note the ground tip and the combination of pick and sledge hammer.¹²

¹² BBC publications *Who Do You Think You Are* December 2010 cover of CD.

Appendix 11 Twelve photographs of some of the foundation structures at the Transvaal mine, most of which date from the 1920-1927 period.



Fig. 1 View looking down onto the shaft cap.



Fig. 2 Part of the concentration plant foundations.



Fig. 3 Boiler plant foundations.



Fig. 4 Tube mill plant foundations.



Fig. 5 Presumed Godfrey roaster foundations.



Fig. 6 Boiler plant external wall foundations.



Fig. 7 Secondary crusher foundations.



Fig. 8 Ball mill plant foundations.



Fig. 9 Collapsed upper stope near winze E2.



Fig. 10 Part of the boiler plant foundations.



Fig. 11 Filled-in 1889 prospect shaft.



Fig. 12 Blast furnace foundations.



Fig. 13 Dry stone retaining wall in boiler house pit. Reuse of 1890s dressed stone.



Fig. 14 Concentration Plant wheel pit and office foundations in foreground.



Fig. 15 1890s jaw crusher foundation.

Photographic collection of the excavations at the Transvaal mine.



Fig. 16 Manager's house excavations in progress.



Fig. 17 Ground level photograph showing the raised profile of the manager's house area.



Fig. 18 The removal of the green glass vessel number DWA209IR/Q8/a8/GF16 from the trench.



Fig. 19 Manager's outhouse foundation excavation.



Fig. 20 Team members excavating U9 trench at the single quarters.

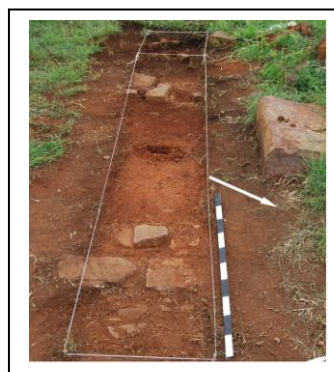


Fig. 21 Completed trench in U9 – single quarters showing the two rows of foundations.



Fig. 22 Line of dressed stone blocks in farm road to the north of the single quarters excavation trench. It is believed to represent the foundations of the northern end of the eastern wall of the building.