

THE
GOLD MINING INDUSTRY
IN GHANA

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"Gold is really the most romantic of research topics and deserves better than to be considered purely in statistical terms".

Charter Consolidated, Ltd.

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ABSTRACT

In January 1961, a fundamental change in the structure of ownership of the gold mining industry in Ghana occurred, when the State entered this field of economic activity for the first time. From 1877, the industry had been owned, financed and operated by foreign-based limited liability companies. Although the industry was slow to mature largely owing to the constraints of the subsistence environment, it proved to be one of the main spearheads in the structural transformation of the economy from a subsistence to a monetary basis. By the first decade of the twentieth century, the full geographic extent of gold mining had been established, and today the mining towns which have grown up in these areas are among the largest settlements in their respective regions, and support a population of over 60,000 inhabitants.

Geographically, the gold mining centres created 'islands of development' in an otherwise underdeveloped hinterland, and throughout its history, much of the value of gold won left the country in the form of salaries repatriated by the expatriate staff and as dividends to the shareholders abroad. Nevertheless, gold has traditionally been a leading export, second only to cocoa in its contribution to the value of exports, and through diverse payments of export duty, taxes, royalties and the purchase of local goods and services, the gold mining industry contributed to the well-being of the economy. In addition, by employing labour on a large scale, the gold mines represented key foci in the labour market.

Production was interrupted by two world wars, and the inflationary economy which developed after the second world war had a dramatic effect on both the geographic distribution of gold mining and its profitability in the post-war decades. By 1960, only seven companies

had survived and further closures were imminent, unless financial support could be secured from the Government. The Ghana Government chose the alternative of buying the marginal mines instead of supporting the private companies indefinitely by public subsidy. In January 1961, therefore, five of the seven remaining companies were purchased by the State, and a sixth was added in 1965. These mines were incorporated as the State Gold Mining Corporation, and there remains only one gold mining company in the private sector.

The takeover of the marginal gold mines was based on socio-economic principles; to maintain output and employment in these long-established mining communities and to earn foreign exchange for the economy. In contemporary Ghana, the two major political and economic problems are a high level of unemployment and an acute shortage of foreign exchange, with the added burden of large-scale external commercial debts. In these terms, the justification of keeping open unprofitable enterprises by public subsidy can be readily understood. The inter-relationship between politics and geography is well demonstrated by the survival of the gold mining industry in Ghana.

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INTRODUCTION

The purpose of this study is to examine the extent to which the gold mining industry has affected the economic geography of Ghana, the problems the industry encountered in its growth and development, and its contemporary importance in the economy. In these terms, the study fulfils a two-fold aim:

(i) The history of gold mining in Ghana is largely unwritten, and so the first objective of the study is to fulfil the need for such a piece of work. The growth and development of the industry is essentially presented from the geographical point of view in an attempt to assess the impact gold mining has made on the spatial pattern of economic activity in Ghana. At the same time, the industry is treated as an entity in itself.

(ii) The second aim of the study is to analyse the performance of the industry in the modern context, largely from an economic point of view, in an attempt to assess the contemporary importance of gold mining in the economy of Ghana. Within this framework, the survival of the gold mining industry in Ghana is assessed in the light of the current economic pressures which face all gold producers.

Thus, the two aims of this study, while distinct, are complementary; the historical growth and development of gold mining providing the basis on which the modern structure of the industry can be more readily analysed and understood.

Within these terms of reference, it is the thesis of the author that, historically, the gold mining industry was one of the key initiators in the structural transformation of the economy of Ghana from a subsistence to a monetary basis, and that, once established, the

gold mining industry stimulated certain lines of change which affected the regional pattern of development in the country. The first line of railway was constructed to serve the mining districts and large settlements have grown up in these areas. It was the gold mining companies that first introduced men from the Northern Territories to wage-earning employment in the South, and the seasonal pattern of migration from the North remains an important feature of the labour market. Despite the growth of other forms of economic activity in the industrial sector, gold mining continues to be a key element in the economy, functioning in its dual role as a major source of employment and as an earner of foreign exchange. In recent years, gold has declined relative to other products in its contribution to the value of exports, but gold still has a real and continuing contribution to make to the economy because of its stability on the world market. This intrinsic quality sets gold apart from Ghana's other main exports which all suffer the volatility characteristic of the market for primary products. In essence, the gold mining industry has both a historical and contemporary importance for the country, and this study attempts to emphasise both.

Gold is only one of the economic minerals exploited in Ghana for the export market, the others being diamonds, manganese and bauxite. For geological reasons, all the gold mines are located in the south-west part of the country, where they form in effect 'islands of development' in an otherwise underdeveloped, although not undeveloped, hinterland. The forest belt of the south and west is the source of all the main export commodities of Ghana, for this region contains, in addition to the gold mines, the principal diamond, manganese and bauxite workings, as well as the main timber and cocoa-producing districts. However, it is the gold mining towns which have attracted population and tertiary

activities. Thus, the mining towns stand out as pockets of high-density in an otherwise sparsely populated hinterland. Today the mining towns are among the largest settlements in their respective regions.

Since modern mining is a highly capital-intensive enterprise, the gold mining industry in Ghana today is organised into a few large-scale units, operated and administered by private and publicly-owned corporations. The modern structure of ownership, divided into a private and public sector, is of recent origin, dating from 1961. Formerly, the gold mining industry was owned and operated by foreign-based limited liability companies which had worked the gold deposits in the country since the late 1870s. At the turn of the century, as many as 400 companies were registered and held mining concessions, although relatively few ever took up their options. In fact, as far as the records show, the maximum number of companies carrying out active work (although not necessarily producing) on their properties was no more than thirty-one; this was recorded in 1936-37, at a time when the industry was experiencing a renaissance. Today, only one company survives in the private sector, the Ashanti Goldfields Corporation, Ltd., which has been in production continuously since 1897. The Ashanti company was recently (January 1969) taken over by the Lonrho group, a conglomerate company which holds investments in mining and other fields in Ghana and elsewhere in Africa. The mines operated by this company, on its 100 square mile concession, remain the only profitable gold mines in Ghana. By contrast, the public sector, comprising the State Gold Mining Corporation, operates four deep-level gold mines and one gold-dredging subsidiary, but none of these enterprises is profitable. Production from both sectors is destined for the export market, the locally smelted gold being sent to England for refining. A gold refinery was, in fact, built in Ghana in

the mid-1960s, at Tarkwa, but it has not been put into production and is unlikely to be so in the future since Ghana's gold output is insufficient to support the high cost of maintaining a refinery.

The private sector produces two-thirds of the gold output of the industry, and employs one-third of the labour engaged in gold mining. In addition, the private sector provides revenue for the local treasury through various payments; profits tax, minerals duty, the purchase of local stores and ancillary services. On the other hand, the State mines produce only one-third of the total output of the industry, the sale of which earns Ghana valuable foreign exchange, but they employ two-thirds of the labour force of the gold mines, which helps to absorb some of those who would be otherwise unemployed. Indeed, in socio-economic terms, the State group has a more important role to play in the economy. The State Gold Mining Corporation was created as part of a wider economic policy of maintaining employment and output in long-established enterprises in an attempt to redress the negative balance of payments and the high level of unemployment which has characterised the economy since independence. By independence, the majority of the gold mines had become marginal concerns, and the State purchased five of the seven surviving gold mining companies in 1961 to prevent the social disruption which their closure would have meant in the mining communities where no other source of employment on a comparable scale exists. In addition, the loss of revenue from gold mining, had the threatened closures taken place, would have had an adverse effect on the economy, which was becoming more and more heavily indebted to overseas creditors.

OUTLINE OF THE THESIS

After a brief survey of the literature available on the subject of gold mining in Ghana, some comments are made on the problems of field research in mining as judged from the experience of the author in Ghana. The study is divided into three parts. The first part provides a general background to the study in theoretical and physical terms, thereby creating the framework on which the historical evolution of gold mining in Ghana is superimposed in the second part. Finally, in the third part, the performance of the industry in the modern context is analysed in some detail, based on data collected in the field. Part I comprises two chapters, the first treating the gold mining industry in Ghana within the general theoretical framework of mineral geography. The factors in mineral exploitation are discussed, and the case-study placed into this general context. In this way, the unique characteristics of gold in general and gold mining in Ghana in particular are presented. In the second chapter, the geological basis of gold mining in Ghana is described, as an aspect of Chapter 1 that deserves separate examination since the geological conditions of mineral exploitation are, in absolute terms, the determining factor in the location of mining activity. Thus the geographical distribution of gold mining in Ghana is the main focus of Chapter 2, which is briefly introduced by a note on gold and its geological characteristics, the place of gold mining in the general African and regional contexts, and concludes with a commentary on the practical problems of mining which derive from the nature of the gold deposits in Ghana. Part II contains four chapters, preceded by an introduction. Each chapter describes a period in the historical growth and development of the gold mining industry with special reference to the impact the industry made on the economic landscape and on the

structure of the economy in the periods selected. Throughout the historical analysis, which covers the period 1877-1961, emphasis is placed on the various constraints and stimuli to the geographic spread of gold mining, and the associated effects thereof, both on the industry's performance and on its contribution to the economy. In Chapter 3, the intrusion of modern mining is described, and its effect on the structural transformation of the economy is indicated, and in Chapter 4 the consolidation of gold mining as a permanent feature of the economic landscape is outlined. Chapter 5 involves the revival of interest in gold mining in the country, and the beneficial effects to the economy arising out of this revival. Finally, Part II is concluded in Chapter 6 in which the post-war contraction of gold mining is analysed, and the history of the industry brought up to 1961, when the State entered the field of gold mining for the first time. Part III, comprising Chapters 7, 8, 9 and 10, completes the study. In each chapter, an aspect of gold mining in Ghana is analysed, with particular reference to the performance of the State Gold Mining Corporation. In Chapter 7, case-histories of the mines of the State group are presented and provide the background to the detailed study of their performance since takeover in 1961. In Chapters 8 and 9, the production of, and employment in the gold mining industry are surveyed, and in Chapter 10, an analysis of the economics of gold mining is undertaken in an attempt to assess the extent to which the State Gold Mining Corporation has fulfilled the socio-economic objectives with which it was charged: to maintain employment and output in the mining communities. The cost of government support of the sub-marginal mines is, therefore, weighed against the benefits arising out of this policy. Finally, the salient points of the study are summarised, and the general implications and conclusions are presented.

REVIEW OF THE LITERATURE

Since no comprehensive survey of gold mining in Ghana has been previously undertaken, it will be useful to comment on the source material available and to indicate those works which seem to be of greatest importance. There exists, in fact, a surprising volume of literature, in published and unpublished documents, of varying usefulness to the research worker in this field. The published material is scanty and deals with the field in breadth rather than in depth, whereas the unpublished sources are not only more numerous and more detailed, but also more interesting and substantial in content.

The published works can be divided into four main groups: references to gold mining in books, both academic and narrative; articles in periodicals; departmental reports of the various ministries of the Ghana Government; and 'ad hoc' reports on the mining industry. The first of these sources is the least fruitful, since gold mining is generally treated as part of the wider economic fabric of the country. However, two texts deserve particular mention:

"Structural changes in the economy of Ghana, 1891-1911"

(Szereszewski, R., 1965); and

"A study of contemporary Ghana" (Birmingham et alia, eds., 1966, Volume I - The economy of Ghana).

Szereszewski's text covers the early pioneering years of commercial gold mining, and while the main focus of his work is the role which cocoa played in the structural transformation of the economy, he does place gold mining in the wider context of the early economic development of the country. Chapter 11 of the latter work deals with the modern performance of the mining sector in general, but also gives a particularly enlightened account of the contemporary problems of the gold mining

industry. Both works were produced by economists, and it is noteworthy that geographers have paid scant attention to the subject, except to place gold mining in the context of the general geography of Ghana; as in E.A.Boateng's "A geography of Ghana" (1968), and K.B.Dickson's recent book, "A historical geography of Ghana" (1969). The most interesting literary work, which gives a remarkably vivid picture of the environmental problems which the early pioneers faced in developing the gold-fields, is "We two in West Africa" by D.Moore and F.G.Guggisberg (1909). It is notable that the large body of published works devoted to gold and the gold mining industry of the world is largely devoid of anything but passing reference to the gold mining industry in Ghana; one of the most recent of these, "The world of gold", by T.Green (1969) dismisses the gold industry in Ghana in a few lines.

The second category of published material comprises a vast number of articles which vary in their usefulness to the geographer since most are found in technical journals oriented to the needs of the mining engineer, the metallurgist, the geologist and related professions. The Transactions of the Institution of Mining and Metallurgy deserve particular mention since they contain some of the most informative, accurate and reliable accounts of various aspects of mining in Ghana. Articles are also scattered in trade or other non-learned journals, but in common with much secondary source material, accuracy is sacrificed to the literary panache of the author, and are too lacking in objectivity to be very useful. Geographical journals are especially barren on the subject. The large collection of old newspapers, published in the former Gold Coast and held in the Colindale branch of the British Museum, is an interesting source of historical information, although the factual content of many of the articles is minimal. For contemporary commercial

news, the London-based weekly, "West Africa", covers the main events in the industry with reasonable accuracy.

Thirdly, there are the departmental reports, as the Annual Reports of the Mines department, which date from 1903, and the Annual Reports of the Geological Survey Department, which date from 1913, as well as the Annual Reports on the Gold Coast Colony, Ashanti and the Northern Territories, and the accompanying Blue Books of Statistics. In all three series, the gold mining industry is dealt with in summary form, and their usefulness is accordingly limited to providing a general picture of the state of the industry in any one year. Of greater significance are several Bulletins and Memoirs published by the Gold Coast Geological Survey, and those of the inter-war period are particularly relevant to the gold mines. These provide detailed information about the geology of the goldfields, are well illustrated with diagrams and maps, and also carry historical commentaries on the principal gold mining companies. These publications are the most substantial of all the secondary sources of material and they are still consulted by the mining companies in respect of the geological information they contain. Finally there are the Annual Reports of the local Chamber of Mines and they contain useful summaries of the events in any one year as they affect the mining industry, such as labour disputes and legislative developments. These reports, which date from 1928 also carry statistical appendices, both on individual companies and summary returns for the mining industry as a whole.

Finally, in this brief survey of published sources, valuable information is contained in 'ad hoc' reports. While no report has been produced exclusively on gold mining, the mining industry has been subject to official enquiries on two occasions. In 1953, the "Report of the Mines

Labour Enquiry Committee" was published. The terms of reference of the working party were, "To enquire into the conditions in which labour employed in the Mining Industry works and lives, having particular regard to such factors as Housing, Social Environment, Health and Welfare, Feeding and Underground conditions and to report". This survey was purely a fact-finding one and no recommendations of policy were involved. The second report, "Report of the Gold Coast Mines Board of Enquiry", published in 1956, was aimed at discovering the extent to which the mines were profitable with particular reference to their ability to survive further proposed wage increases. This enquiry arose following a general strike of all mine workers in support of wage claims. Both documents contain useful historical and statistical data. Apart from these two official enquiries, a few other official papers of earlier date have a bearing on the development of the industry. Professor W.Simpson's "Report on the sanitary conditions of the mines and mining villages in the Gold Coast Colony and Ashanti" (1924), and "Report on Silicosis and Tuberculosis among mine-workers in the Gold Coast" by A.J.Murray and J.A.Crocket (1946) provide background information on the social conditions which existed in the earlier period. The economic situation of the gold mining industry in the immediate post-war years is well covered in the award of an arbitrator (William Gorman) who was called in to settle a wages dispute in 1947; his report (briefly known as the Gorman Award - for full reference see Bibliography) was fully appendiced, and these contain valuable statistics and other exhibits which clarify some of the problems faced by the industry in this period.

The published sources are limited in number and scope, but nonetheless provide valuable generalised information upon which the

results of detailed investigation of the subject from unpublished material and interviews can be superimposed. In this context, the unpublished documents are much more significant for they allow a deeper understanding of the problems the industry faced in its growth and development. Undoubtedly, the most exciting source of historical information is to be found in the files of the Public Record Office in London, where is kept the original correspondence between the mining companies and the Colonial Office. These bound volumes of letters are classified under C.O.96, and from 1880 to 1937, there are over 600 volumes: C.O.96/133-C.O.96/741. In addition, there is the series of confidential print, a collection of printed papers in which selected correspondence, memoranda and other documents were copied for internal use in the Colonial Office; of these, fourteen volumes are relevant to the investigation, and are classified under C.O.879. All the Gold Coast Government Acts, Sessional Papers, Government Gazettes and the Blue Books of Statistics (C.O.97, 98, 99 and 100 respectively) are also located in the Public Record Office. It is, however, the correspondence which gives a much clearer picture of Colonial Policy toward the gold mining industry, and its effect on the geography of Ghana can be extracted by a thorough examination of these letters. It is worth noting that the National Archives of Ghana in Accra is a very disappointing source of material for this investigation since the collection of documents is limited and cannot compare with those of the Public Record Office. Much of the detail of Part II was derived from the original correspondence. By contrast, the findings presented in Part III of the study were based largely on statistical and documentary material generously supplied by the State Gold Mining Corporation. The greater part of that material is confidential, and accordingly, to

respect the confidentiality of many of the documents and maps consulted, many of the references quoted in Part III are labelled under the 'umbrella' title, S.G.M.C. Also for this reason, the detailed statistics on which most of the results are based are not reproduced. The interpretation of the facts and figures consulted in the files of the State Gold Mining Corporation is entirely that of the author, and does not necessarily represent the official view of the Corporation, unless otherwise stated.

Finally, some comments on the problems of research in the field of mining seem apposite. From this review of the literature, and in the experience of the author, the most difficult problem is that of gaining access to detailed information about the operations of the mining companies, and this difficulty is largely responsible for the imbalance in the treatment of the modern structure of the gold mining industry presented in Part III of the study. The emphasis lies on an analysis of the performance of the State mines, while the private sector is largely ignored in detail despite the important contribution which it makes to gold production and the employment of labour. However, it was impossible to gain access to material about the Ashanti mine beyond that which is made public. Since any meaningful analysis depends almost entirely on the degree of co-operation which the researcher meets, the rather superficial comments about the private sector's performance should be understood in these terms. Indeed, the original plan of the study, to assess the impact of all the export minerals on the economic geography of the country, had to be abandoned owing to the lack of detailed information from the private companies engaged in diamond, bauxite and manganese mining; Consolidated African Selection Trust, the British Aluminium Company, and the African Manganese Company respectively.

The general unwillingness of private companies to divulge information is understandable, but undoubtedly this is the major obstacle to detailed research work. Finally, no attempt was made in the study to investigate the mining settlements because of recent work done in this field by S.A.Darko, on the theme, "The changing pattern of settlements in the mining areas of Ghana" (unpublished M.A.thesis, University of London, 1962).

MINING IN THE ECONOMY OF GHANA

Ghana's economy is still basically agricultural, dominated by economic activity in the rural economy. The pre-industrial sector absorbs about three-quarters of the labour force, and cocoa, other agricultural and forest products make up over half the Gross Domestic Product (G.D.P.). Cocoa is the most important single commodity in the economy, contributing some ten per cent of G.D.P., and nearly two-thirds of the value of exports. Thus, Ghana's internal and external situation is heavily influenced by cocoa, a crop which is subject to large fluctuations in quantity, price and, to a lesser extent, value. The historical importance of the mining of gold, diamonds, manganese and bauxite in the economic development of Ghana is great, but, in recent years, the mining sector has come to play a relatively minor role in the national economy in terms of its contribution to G.D.P. and employment. The mining sector's share of G.D.P. has fallen from 5.7% in 1957 to 3% in 1967, and its share of wage-earning employment has fallen from 12% in 1957 to 2% in 1967.

The central problem in the Ghanaian economy since Independence has remained the balance of payments, with high unemployment an added pressure. It is in these broad terms that the mining sector has a

continuing importance; it is the second largest earner of foreign exchange after cocoa, exports amounting to 15% of the total value of exports of domestic produce in 1967. In addition, the mines are points of large-scale employment; in 1966, the mining industry employed a total labour force of some 21,000, of which the gold mines employed the greater proportion, some 18,000. In recent years, the physical output of the mining sector has declined; in 1967 (with 1958 as the base year), the index of mineral production had dropped to 89.1 (Fig.1). Any reversal of this trend depends on Government policy and on the state of the world market. As far as gold is concerned, it should continue to play its vital role as a stabilising element in the export trade of the country, assuming continued Government support for the industry. The contribution of the other minerals exported is less certain since their output and export value is conditioned by world demand, price variations and the degree of competitive advantage which the producers in Ghana can achieve. Nevertheless, since agriculture occupies a strategic role as a potential source of additional exports, food and industrial raw materials, employment, and as a means of reducing disparities in income and of slowing down the drift to the towns, the highest priority in economic planning over the next few years will be given to the promotion of agriculture consistent with sound economic operation.

MINING POLICY AND THE RELEVANCE OF THE STUDY

It is recognised that the critical shortage of foreign exchange, combined with the magnitude of the external indebtedness of the country, is the most pressing and immediate problem the economy faces, and indeed is the major constraint on its development. At Independence, Ghana's

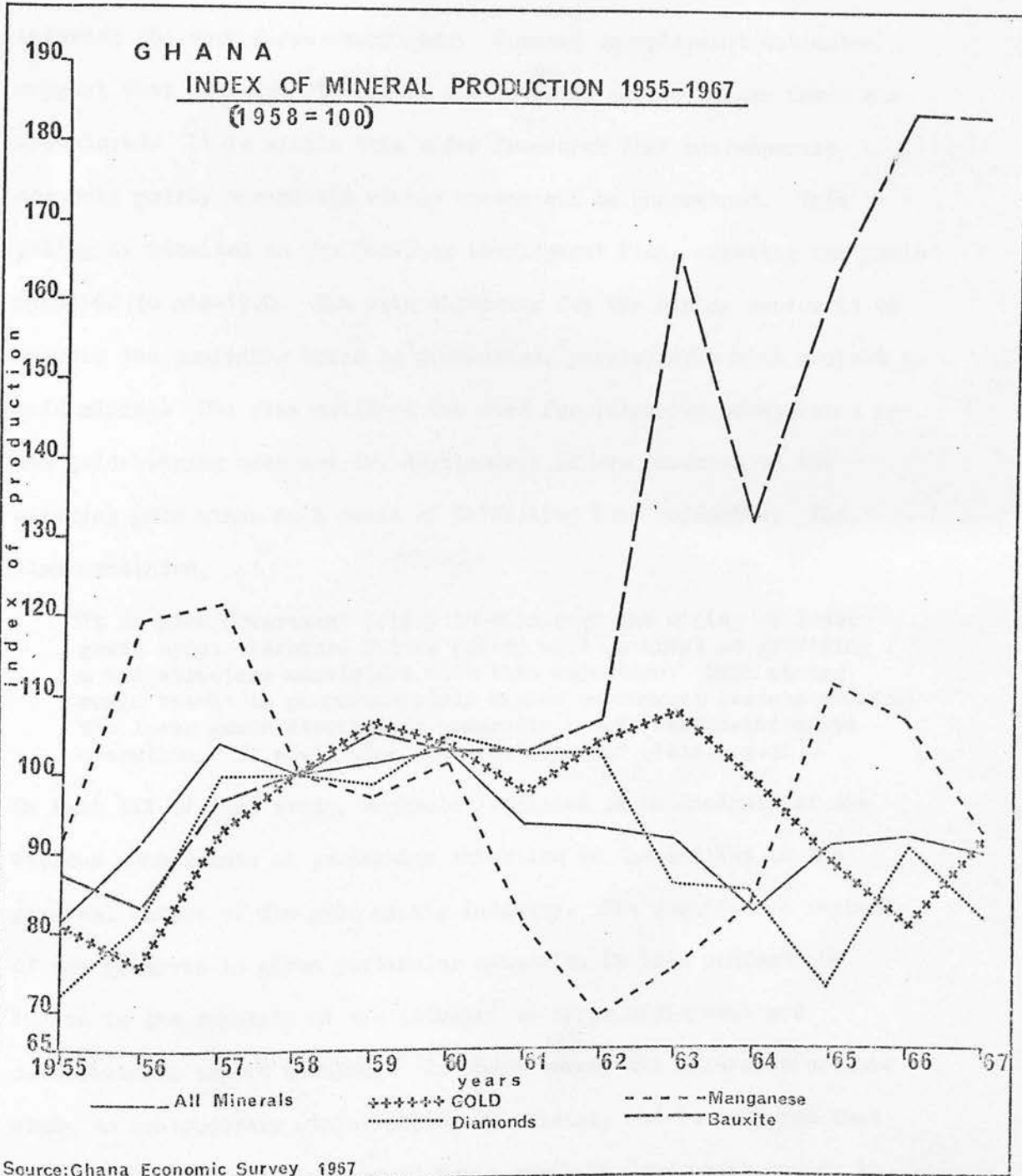


FIG 1

foreign exchange reserves amounted to over £200,000,000 and by 1966, the Nkrumah regime had accumulated external commercial debts of some £300,000,000. It is also recognised that unemployment is a serious economic, social and political problem. Wage-earning employment has stagnated at about 356,000 since 1966, and there are some 200,000 entering the work force every year. Current unemployment estimates suggest that at least 25% of the economically active labour force are unemployed. It is within this wider framework that contemporary economic policy toward the mining sector can be understood. This policy is detailed in the Two-Year Development Plan, covering the period mid-1968 to mid-1970. The main objective for the mining sector is to reverse the declining trend in production, particularly with respect to gold mining. The plan outlines the need for intensive prospecting for new gold-bearing ores and the development of ore reserves in the existing gold mines as a means of fulfilling this objective. The plan continues,

"It is also Government policy to encourage the mining of lower grade ores; therefore future policy will be aimed at providing a tax structure consistent with this objective. Such mining would result in proportionately higher employment because working the lower grade deposits is generally a more labour-intensive operation. It would also increase exports" (ibid., p.46).

In Part III of this study, emphasis is placed on an analysis of the various constraints on production which led to the decline in the physical output of the gold mining industry. The position in respect of ore reserves is given particular attention in this context, as indeed is the capacity of the industry to offer employment and contribute to export earnings. In these terms, the relevance of this study to contemporary mining policy is evident, and it is hoped that this study will justify the need for a positive Government policy to ensure the survival of the gold mining industry in Ghana.

THE ECONOMIC SITUATION IN THE UNITED STATES

INTRODUCTION

Money is the only medium of exchange available in modern societies in the monetary economy of which it has been generally held to be the primary instrument in every part of the world (Mises, 1952, p. 61).

This statement supports the thesis of this study that the gold mining industry in the United States is one of the most important in the production and distribution of the national income.

PART I

BACKGROUND TO THE STUDY

It is the purpose of this study to examine the role of the gold mining industry in the United States economy. The gold mining industry has played a significant role in the history of the United States. It has long figured as one of the traditional staples of the West along with sugar and cotton, although more recently a change has been taking effect with the large-scale immigration of Chinese and Japanese immigrants, especially from the West Coast, and the resulting agricultural boom and the production of such commodities as wheat and cotton. It is a reflection of the increasing demand for gold in the world for various purposes of supply, as well as a large number of other uses, that the ever-increasing demands of the world for gold have led to the search for new sources of supply. The production of gold in the United States is...

THE THEORETICAL FRAMEWORK TO GOLD MINING IN GHANAINTRODUCTION

"Mining is the only sector of economic activity in Africa entirely in the monetary economy of which it has been and still is one of the decisive initiators in many parts of the continent" (U.N., 1959, p.61).

This statement supports the thesis of the author that the gold mining industry in Ghana was one of the key elements in the structural transformation of the economy from a subsistence to a monetary basis. Since mining is based on 'wasting assets', its impact on the economic landscape is necessarily ephemeral, but the sectoral changes which mining stimulates have a lasting effect on the spatial pattern of economic activities in any country. Such has been the role of the gold mining industry in Ghana.

More than one thousand years ago, the gold trade flourished on the coasts of Africa, and ever since, mining of gold and other minerals has played a special role in the lives of Africans. Gold has long figured as one of the traditional commodities of Africa, along with copper and diamonds, although more recently a change has been taking effect with the large-scale exploitation of other mineral resources, especially iron ore, bauxite and petroleum. The changing emphasis from the precious metals to the non-ferrous and fuel minerals is a reflection of the increasing world demand for more and varied sources of supply, as well as a larger number of minerals to satisfy the ever-increasing demands of industry. Indeed, the sequence of mineral exploitation in Africa clearly demonstrates the 'mineral cycle' proposed by De Launey. The exploitation of minerals has been one of

the main bases of many of the national economies of Africa, a continent which is characterised by "islands of development" created in many instances by mining activity. Indeed, the concentration of mineral income at a few foci is one of the typical geographic expressions of mineral exploitation, resulting both from the uneven distribution of mineral deposits in nature and from the uneven distribution of production in the national, regional and local contexts. Nevertheless, income from the mineral industry is a more important part of the Gross National Product of Africa than of any other continent, and it is the mining sector which has attracted most of the foreign investment in Africa. As a result, a not insignificant part of the income of those African states, as Ghana, richly endowed with mineral resources has traditionally been derived from export duties, taxation on profits, and royalties levied on the producers and from import duties on equipment and materials required by the mining companies. Today this is even more true owing to the recent trend toward greater State participation in the mineral industries in many African countries.

Prior to the Industrial Revolution, mineral output in Africa was limited by the prevailing simple, labour-intensive mining methods, by the lack of technical knowledge, by poor communications and the primitive transport systems, by the ignorance of the value or demand for most metals, and by inadequate capital resources to develop them. At the turn of the twentieth century, most of these former constraints on production were removed with the building of railways, the opening up of the interior, and the inflow of both capital and talent of individuals and later companies from Europe. There is no doubt that it was Africa's mineral prospects, and particularly the gold prospects, which first stimulated large-scale foreign investment in Africa, whose

mineral resources are surpassed only by those of North America, and which dwarf those of South America, Western Europe, Southern Asia and Oceania (De Kun, 1965, p.3). In addition to gold, Africa also plays a significant part in the production of minerals in industry (Table 1.1).

Gold represented no less than one-third of the value of African mineral output in the early 1960s, rising from a value of some £250 million in 1957 to over £400 million in 1964. Since 1965, gold's share has been declining relative to other minerals, in particular oil, which is forecast to deprive gold of its traditional first place by value in the mineral exports of Africa. In absolute terms, however, it is likely that Africa will continue to be the world's leading supplier of gold, with South Africa maintaining its predominance (Table 1.2).

It is apparent from these statistics that Ghana can only be regarded as a minor gold producer, despite its ranking as sixth largest producer in the world, a position which it has maintained for most of the twentieth century. Nevertheless, its importance in the economy of Ghana has been a major one. In many of its aspects the gold mining industry in Ghana may be regarded as a microcosm; the nature and variety of problems which faced the growth and development of the industry and the current difficulties which confront the industry in Ghana reflect in miniature the circumstances of the broader world scene in the field of gold mining. In addition, the case-study illustrates many of the general principles of mineral geography, as the following discussion of the factors in mineral exploitation brings out.

TABLE 1.1

AFRICAN CONTRIBUTION TO WORLD PRODUCTION
OF SELECTED MINERALS FOR THE YEAR 1962

Mineral Group	World Output (tons)*	African Output as % World Output
<u>I. STEEL INDUSTRY METALS</u>		
Iron ore	500 m. (long)	4
Chromite	5 m.	30
Manganese	15 m.	20
Nickel	250 th.	1-2
Molybdenum	90 th.	insignificant
Cobalt	15 th.	70
Vanadium	13 th.	30
<u>II. BASE METALS</u>		
Copper	5 m.	
Zinc	4 m.	10
Lead	3 m.	under 10
Tin	200 th. (long)	over 10
<u>III. LIGHT METALS</u>		
Bauxite	30 m. (long)	16
Titanium	2 m.	10
<u>IV. STRATEGIC METALS</u>		
Uranium	30 th.**	over 10
Zirconium	170 th.	10
Lithium	100 th.**	66
Beryllium	10 th.	under 50
Columbium	4 th.	nearly 100
Tantalum	200-600	nearly 100
<u>V. PRECIOUS METALS</u>		
Gold	50 m. (oz)	over 50
Silver	250 m. (oz)	4
Platinum	1 m. (oz)	28
Gem diamond	7 m. (carats)	93
Industrial diamond	27 m. (carats)	98
<u>VI. ELECTRICAL INDUSTRY</u>		
Cadmium	25 th.	8
Mercury	9 th.	insignificant
Selenium	1 th.	5
Germanium	80-100	66

(continued overleaf)

TABLE 1.1 (Continued)

Mineral Group	World Output (tons)*	African Output as % World Output
<u>VII. CHEMICAL INDUSTRY</u>		
Pyrite and sulphur	8 m. (long)	3
Antimony	60 th.	20
Baryte	3 m.	4
Fluorspar	2.5 m.	4
Diatomite	1.5 m.	2
Arsenic	60 th.	-
Bismuth	7 th.	under 1
Sodium	20 m.	1
<u>VIII. AGRICULTURE</u>		
Salt	100 m.	2
Phosphate	45 m. (long)	25
Nitrogen	15 m.	2
Potash	12 m.	insignificant
<u>IX. BUILDING AND CERAMICS</u>		
Cement	340 m. (long)	2.5
Gypsum	50 m.	2
Asbestos	3 m.	15
Mica	200 th.	2
Vermiculite	300 th.**	30
Talc	3 m.	0.1
Pumice	14 m.	0.1
Graphite	500 th.	3

* all quantities in short tons, unless otherwise stated.

** free world output only.

Source: De Kun, 1965, pp.3-9.

TABLE 1.2

FREE WORLD GOLD PRODUCTION (METRIC TONS) : 1964-1968

Country	1964	1965	1966	1967	1968	% output
South Africa	905	950	960	950	970	76.8
Canada	118	112	102	92	84	6.6
U.S.A.	45	53	56	49	48	3.7
Australia	30	27	28	25	24	1.7
GHANA	27	23	21	24	22	1.7
Rhodesia	18	17	17	16	16	1.3
Philippines	13	13	14	15	16	1.3
Colombia	11	10	9	8	7	0.6
Japan	9	9	8	8	7	0.6
Mexico	7	7	7	6	6	0.5
Nicaragua	7	6	5	5	4	0.3
Congo	7	2	5	5	4	0.3
Brazil	4	5	6	6	6	0.5
India	4	4	4	3	3	0.3
Elsewhere	50	49	48	47	45	3.8
TOTAL	1255	1287	1290	1259	1262	100.0

Note: 1968 Estimate for U.S.S.R. of 450 metric tons.

Source: Gold, a World Survey, Charter Consolidated Ltd., 1969.

FACTORS IN THE EXPLOITATION OF MINERALS

Mineral exploitation is subject to a variety of factors of diverse origin: geographical, geological and technological, economic, social and political. The known existence of a mineral deposit is not sufficient to warrant its immediate exploitation. Its value is conditional on man's needs, his willingness to pay to satisfy his needs and his technological capability to overcome the problems in the equation. Before mining proceeds, an evaluation of all the relevant factors is necessary since mining is the most speculative and risky form of capital investment in the whole spectrum of man's economic activities. The exploitation of a mineral deposit will therefore normally begin only when and where the combination of factors proves favourable and profits are assured. Because of the several risks in mining a larger profit is deemed necessary than in fabrication or manufacturing to justify the risks involved. Gold, however, is something of an exception in that man has not always awaited the point in time or space at which the optimum or near-optimum balance of factors has presented itself. Gold has always carried a unique attraction to man, who by exploiting it in the remote corners of the globe, has disobeyed the normal sequential pattern of mineral exploitation.

With the foregoing general points in mind, the rest of the chapter is devoted to an assessment of these various factors and the relevance of each to the case-study. This in turn serves to illustrate the unique position gold holds in the mineral world, while at the same time sets the local scene for the main body of the study.

1. Geographical Factors in Mineral Exploitation

The most important geographical factors influencing the development of mineral deposits comprise the influence of climate, the availability of transport and the supply of labour.

(i) Climate

While underground mining conditions are not affected by surface climatic changes, surface operations are often handicapped by variations in temperature, rainfall and other elements. Under extreme conditions, mining may even be reduced to a seasonal activity. On a world scale, it is evident that the distribution of metallic minerals is intimately associated with orogenic belts, and the most extensive belts of mineralisation are found in Pre-Cambrian shields and younger mountain belts. Typically, these structural elements are located in regions which suffer climatic hazards; from the extreme cold of the Canadian and Siberian Shields, where ores freeze hard, as does machinery; to the desert heat of the Western Australian Shield, where water supply for processing and domestic use is often difficult to obtain; to the high mountain mines of the Andes, where the rarified atmosphere induces mountain sickness and diminishes the efficiency of labour.

In Ghana, the mineralised zone is located in the south-western part of the country, where the Pre-Cambrian Shield (part of the wider Guinean Shield) is exposed. This region is subject to a Tropical Maritime regime, characterised by high temperatures all the year round (mean 80 degrees Fahrenheit), high humidity (rarely dropping below 75%), and heavy rainfall (over 60 inches per annum). This combination affects adversely the efficiency of both men and machines. The installation of air-conditioning in all surface plants, offices and residences counteracts to some extent the full impact of these

debilitating conditions, although air-conditioning was not available in the pioneering period of the industry's development. As a result, staff turnover was high, tours were of short duration and there was little continuity of management. The unhealthy environment, an indirect effect of the climate, therefore produced inefficiency inasmuch as there were continual changes in staff. In turn, this increased the cost of mining. Equally, it is recognised that the working life of plant and machinery is reduced by up to twenty years in the Tropics, and hence it depreciates at a faster rate than in more temperate climates. In Ghana, it is the gold-dredging operations that are more directly affected by climate than deep-level mining since the bi-modal rainfall regime of the south-west produces varying water levels in the rivers throughout the year. Consequently, in the dry season, the low water level makes flotation of the dredges difficult, and in the wet season, sudden flooding can disrupt operations. On both accounts, dredging is often slowed down or even stopped altogether for short periods each year, and these interruptions ultimately affect the profitability of the dredges. A secondary but important by-product of the climate of the mining areas in Ghana is that the vegetation is High Rain Forest. Prospecting is thus made difficult, both in terms of accessibility for men and equipment and in terms of the oppressive atmosphere which prevails under the thick, closed canopy of trees in the Rain Forest. The drying effect of the Harmattan, which brings some relief to southern Ghana in the first quarter of the year, is minimised in the south-west under the dense vegetation cover. One advantage of the mines' location in the forest zone, however, is the ready availability of timber for fuel and underground timbering. Of local significance, there is one final aspect of climate which deserves mention.

Underground working conditions are made uncomfortable by the steep geothermal gradient and the high humidities which obtain with increasing depth; costly cool air ventilation is installed to offset the worst effects.

Although the problems of mineral exploitation caused by climate are many and varied, their importance must not be exaggerated. In Ghana, the climatic factor was more important in the pioneering years in reducing the efficiency of labour owing to the high sickness rates bred in the environment. It has been possible to overcome some of the effects of climate on the efficiency of man, although at a cost.

(ii) Transport

A second geographical problem of mineral exploitation is related to the availability of transport, vital to the movement of men and machinery to the mining sites, and to the movement of the ores or concentrates to the consuming markets. Most of the important mining centres in the world are now linked to other areas by railways; some built on the expectation of traffic from mining alone; others constructed for more general developmental purposes; and private mining companies have even constructed lines for their own use if the value of the ore bodies justified the capital outlay. On the other hand, as one writer suggests,

"... there must be ... an immense number of ore bodies, unfavourably situated with reference to rail or water transport whose development must remain improbable because the expected gain from the sales of the mineral would not cover reasonable profit and also the amortisation of investment in gear for mining and transporting the produce" (Pounds, 1950, p.245).

Gold is one mineral, however, whose development has not always followed the strict logic of mineral exploitation with reference to accessibility. Throughout history, gold has attracted man into remote, difficult

terrain, lacking links with the outside world; hence, the gold rushes, to California in 1848, to the 'Comstock' Lode of Nevada in 1858, and to Klondike in Alaska in 1896 (Jones, 1963, p.114).

Ghana's gold deposits were no exception in that they too drew men, in the late 1870s to invest capital in what was then a virgin territory, linked rather tenuously by a diffuse network of 'bush' paths. The main gold belt in Ghana begins some 30-40 miles inland from the coast (a treacherous surf-beaten coast with no natural harbours) and stretches in a 100-mile wide zone for 200 miles in a north-easterly direction. The terrain is characterised by a large number of small rounded hills, separated by narrow valleys, and although no extensive areas of high elevation exist, there are a few isolated ridges reaching 1500-2000 feet (Boateng, 1969, pp.19-20). Several small river systems, principally the Tano, Prah, and Ancobra, drain the south-west, and flow directly southward into the sea. These provided the early and only means of access into the interior in the early pioneering years of the industry's development, but their usefulness as transport axes was extremely limited by the presence of rapids, rock bars and the seasonal variations in the water level. The nature of the relief and drainage in the south-west is therefore inimical to easy road and rail construction, and even at the present time, the road pattern is tortuous and twisting. But, in spite of the environmental problems which confronted the early gold mining companies, and later the railway engineers, the machinery for mining was headloaded to the mining sites, even as far inland as Bibiani, some 160 miles inland from the coast. The ultimate survival of the gold mining industry was secured at the beginning of the twentieth century when a railway, the first to be constructed in the country, was built through the forested south-west.

The line was constructed explicitly to provide the nascent mining industry with a lifeline, as is evident from its alignment; it runs 125 miles from the port of Sekondi-Takoradi to Kumasi, passing through the Tarkwa and Obuasi goldfields en route, and a branch line leads to the Prestea goldfield. From the railway's completion to Kumasi in 1903, the gold mines along or near to the railway flourished, and the line also opened up the interior to other developments, so that the combination of the attraction of gold to investors and the advent of the railway which ensured the profitability of the gold mining industry, had a profound and lasting influence on the economic landscape of the south-west region of Ghana. Because of the mining industry's successful bid for a railway line to serve its needs, the gold mining industry was one of the 'spearheads' which transformed the economy of Ghana from a subsistence to a monetary basis at the turn of the twentieth century.

(iii) Labour

The supply of labour, in both quantity and quality, is a third geographical factor influencing the exploitation of minerals. Since the main metalliferous regions of the world are located in shield and high mountain belts, most are peripheral to the main centres of population and industry. As a result, shortage of labour is a recurrent theme in mineral geography. In the African context it has been said of the entire labour market that,

"... the distinguishing feature of labour problems in Africa is the inadequacy of the supply of labour" (Hailey, 1938, p.603).

In mining, it has been estimated that labour costs constitute some 60% of total operating costs, and that in regions which rely on native labour, labour costs comprise an even higher proportion of working costs

(Hoover, 1933, p.143). The low level of productivity achieved by a native labour force, unused to the regular work patterns of industrial work, largely account for the high cost of labour in such circumstances, where high rates of turnover and absenteeism inevitably increase the cost of mining. In essence, the problems are best summed up in the four-stage sequence involving, "recruitment, advancement, maintenance and commitment" (Kindleberger, 1965, p.105). The mining industry, in addition, faces the problem of attracting expert staff, at managerial and supervisory levels, to work in remote and difficult environments.

In Ghana, the gold mining industry has suffered labour shortages throughout the history of commercial mining. In the pioneering period, mining was on such a small scale that no acute shortages were felt, although the cost of labour was exorbitant since large gangs had to be engaged to headload all the equipment from the coast to the mining sites. With the coming of the railway, and the proliferation of companies at the turn of the century, the difficulty the industry experienced in obtaining an adequate labour supply was a serious threat to its progress, and labour had to be drawn from other West African countries to supplement the local deficit in supply. The south-west was, and still is, sparsely populated, and the mines have always had to tap distant sources; an experiment to bring labour from the Northern Territories was introduced in 1905, and from that time the North has supplied a large proportion of their requirements. By the 1960s, over half the mines' labour force originated in the North. Since the mining industry's labour force is composed largely of migrant labour, high rates of turnover, absenteeism and low productivity are characteristic. In addition, the industry is failing to attract expatriate staff, a problem which has intensified since the State entered the field of gold mining activity.

2. Geological and Technological Factors in Mineral Exploitation

The second set of factors influencing mineral exploitation are those of geological and technological origin. These factors can be conveniently treated together because of their mutual inter-dependence. The discovery of a mineral deposit does not imply that it will be immediately developed. Whether it is opened up or not depends, inter alia, on the geological characteristics of the deposit and the state of mining and metallurgical technology. The geological characteristics which may give value to an ore-body are various; as the grade of the ore which may determine its ability to bear transport costs; the nature of the ore, whether monometallic or polymetallic; its purity, which will determine the ease by which it can be treated; the size and shape of the deposit, which will influence the ease of extracting the metal-bearing ore; the characteristics of the country rock, which will determine the amount of pre-mining preparation, the degree of timbering required, and the stoping method adopted; and the type of deposit which will influence both the cost and method of exploitation. In sum, the complexity of the mineral deposit in its mode of occurrence and in its relationship with other mineral elements pose technological problems for the geologist, mining engineer and the metallurgist. If these problems prove insuperable, either technically or economically, the mineral deposit will be relegated to nothing more than a mass of 'neutral stuff' (Zimmerman, 1951, pp.3-19).

Gold is so overwhelmingly important that, despite the difficulties and costs in extracting gold, man has striven to overcome the geological and technological problems associated with its winning. South Africa has been the source of all the major advances in gold mining technology, which in itself has progressed at a faster rate than

for most other minerals. Nevertheless, although gold is one of the oldest metals known to man, it was not until 1887 that the cyanidation process was invented; this allows gold to be recovered from the most complex ores. Prior to its invention, gold was recovered by simple panning methods from placer deposits; deep-seated lode or vein deposits were technologically inaccessible.

In Ghana, as in other parts of Africa, the natives had a remarkable knowledge of the distribution of gold-bearing rocks, but their primitive technology limited the depth of their 'mining' and the scale of their output. When the first European companies began to work the gold deposits in the country, their knowledge of the geological characteristics and structure of the deposits was also minimal, and the detailed geological mapping was not initiated until the early 1920s. The geological basis to gold mining in Ghana is the subject of Chapter 2; practical mining problems are also examined. At this juncture, therefore, it is sufficient to note that before the advent of mass-mining techniques, many of the small but high-grade pockets were left intact by the early companies. Today, the existing companies find it profitable to re-work the upper levels of the mines to extract the ore left by their predecessors. In the case of dredging for gold, the early dredges in use at the beginning of the century were inefficient which meant that much of the finer gold was not recovered, and,

"... whole villages along the river banks were said to turn out and wash the dredge tailings with considerable profit" (Howat, 1940, p.245).

3. Economic Factors in Mineral Exploitation

Mineral exploitation is also influenced by factors of economic origin, the most important of which are: the demand for the metal and the uses to which it is put; the price level that can be obtained in the world market; the introduction of valorisation and restriction schemes; the invention of substitutes or the obsolescence of the metal in particular end-uses; the discovery and development of new sources of supply; and the technological improvements which may permit the lower grade ores to be mined at a profit. Ultimately, the exploitation of minerals is a matter of economics in that if production costs exceed expected revenue, the deposit will lie unworked until changed circumstances permit its exploitation.

Gold and the other precious metals have an economic value sufficient to overcome the economic constraints of a remote, physically adverse environment, and the inherent value of gold has stimulated technological progress in its winning. However, most of the gold-producing countries today maintain their output only under government subsidy. Gold is unique, in economic terms, for a variety of reasons. Unlike most metallic minerals, the demand for gold is insatiable, so much so that the supply is unable to meet the demand. Secondly, its main end-use, as a backing for national currencies, gives gold an assured market, whatever the level of production, unlike most metals the demand for which fluctuates according to the requirements of industry and other factors. Thirdly, the price of gold is officially fixed at 35 US dollars per ounce. Under the 'two-tier' established in 1968, this is the selling price for monetary gold only, while gold for other uses sells at higher levels according to the condition of the free market, but the free market price rarely moves more than 10 US

dollars above the official price. The gold producers are, therefore, concerned with the problem of balancing revenue with working costs which increase inexorably. Gold mining companies are in the difficult position of being unable to pass on to the consumer any increases in working costs, in contrast with other metal producers who can at least command prices more in level with current production costs. It is significant that gold reacts economically in a direction opposite to other commodities in that,

" ... its production becomes more profitable during periods of economic depression and least profitable during periods of prosperity, especially if accompanied by monetary inflation" (Jones, 1963, p.115).

Fourthly, in contrast to most other metals, gold cannot be debased by being produced artificially, and this is one of the reasons for its continuing acceptability as 'international money'. Gold is, therefore, unique in that gold mining is less subject to the normal array of economic factors in mineral exploitation.

The uniqueness of gold is largely a function of its uses. Historically, gold has been used as both national and international money, although today its main function is in the latter category. However, gold supplies are limited, both by the facts of geology and by the profitability of mining the metal at a selling price of 35 US dollars, and not by lack of demand. Indeed, the phenomenal rise of world business, and the associated demand for international liquidity over the last century, has proved well beyond the capacity of the gold mining industry.

In addition, gold is also used in industry, and the remainder is locked up in private hoards. The leakage of monetary gold to private hoarders is deplored by the official hoarders, since the metal

is in short supply owing to the insufficient growth of the gold mining industry. Despite a series of attempts to move all gold through official hands, gold markets developed in European capitals and elsewhere since the second world war. Accordingly, it has been estimated that only 7 out of 10 ounces of newly-mined gold moved into official reserves between 1935 and 1959 (Busschau, 1961, p.72). Of the remainder, an estimated 12% moved into private hoards and 20% was absorbed by industry and the arts. More recent estimates suggest that an even lower proportion of gold is reaching official monetary stocks; between 1952 and 1957, official reserves received about 52% of total supplies, private hoarders bought 29% and the remaining 19% went to industrial and artwork consumers (Triffin, 1961, p.53). The demand for gold for non-monetary purposes has increased markedly, largely owing to the relative cheapening of the metal, and a growing number of end-uses for gold. In the pre-war years, for example, the most important non-monetary outlet was in jewellery, followed by dental uses. Today, gold is increasingly used as a coating, as protection against heat and corrosion, for aircraft and satellites. High purity gold, employed in the fabrication of silicon transistors and diodes for use in computers, missiles and related articles, can attain a selling price of 65 US dollars per ounce, but only small quantities are required. It has been estimated that by 1987 the demand for gold APART from monetary requirements will reach some 50-60 million ounces (Noakes and Shaw, 1969, p.235). Accordingly, producer surveys it is said suggest that the pressure of traditional hoarding and the ever-widening industrial demand will force an upward trend in price in the future, regardless of monetary factors (Financial Times, 11 January, 1971).

The gold mining industry in Ghana, based on relatively low-grade deposits, suffers particularly from the impact of these external economic factors. On the State mines, working costs are well above the expected revenue, based on the tagged price of 35 US dollars per ounce. Under these circumstances, the survival of the industry depends on continuing government support, since by 1961 all but two of the seven operating mines had become marginal concerns. But since gold has a high internal and external value to the economy, in terms of the large-scale employment generated by the industry and its capacity to earn foreign exchange, the sub-marginal mines continue to operate under heavy government subsidy.

4. Social Factors in Mineral Exploitation

The occurrence of metalliferous mineral deposits in remote shield and mountain areas has social implications for the mining companies. Since mining is more often than not the initial industrial activity in these regions, it falls to the mining companies to create communities, served with a certain minimum of facilities in order to attract and maintain a permanent labour force. There are numerous examples of towns created entirely for mineral exploitation, from Kitimat in British Columbia, to Port Radium in the Canadian Arctic and Kalgoorlie in the Australian desert.

In Ghana, many of the gold mining towns were the sole creation of the mining companies, as Prestea and Obuasi, while others were built around existing urban nuclei, as Tarkwa and Bibiani. The mining towns in Ghana have become the largest settlements in their respective regions, and throughout the history of commercial mining these towns have acted as foci of population attraction. Other activities have multiplied in

and around the mining settlements since the mines offer a considerable market for goods and services. The mines have also provided a wide range of welfare, medical, recreational and other facilities in an attempt to stabilise the mines' labour force, and the provision of these facilities further adds to the cost of mining. Local factors, such as the presence of quartz in the ore-bodies increase the need for precautionary measures against silicosis among the miners. The growth of the mining settlements into sizeable towns illustrates the important role which the industry has played in forming the geography of the country.

5. Political Factors in Mineral Exploitation

Finally, a number of political factors influence the temporal and spatial sequence of mineral exploitation. In essence, the climate of investment in any country endowed with commercial mineral deposits can affect the development of the industry. Prior to the second world war, when the major European powers were still in possession of vast colonial empires, there were relatively few political pressures with which mining companies had to contend. However, with the granting of independence to many territories, particularly in Africa, political independence has brought with it ideas of economic independence, which for the mining companies has often meant nationalisation of their interests or at best a sharing of mineral development with the host government as co-partner.

In Ghana, the gold mining industry grew and developed in the hands of European companies, and few political problems harassed its development. More recently, the high burden of taxation imposed on foreign mining companies is seen as a deterrent to large-scale investment

in the country. Equally, the restrictions on the repatriation of salaries of expatriate staff is said to account for the difficulty the mines experience in attracting staff. The Ghana Government's attitude to foreign investment has been favourable, and in practice, at least up to 1961, the Government allowed the old commercial pattern of colonial days to continue almost unchanged. There was no nationalisation, or expropriation of Western-owned interests on independence. As the Prime Minister said, speaking in the Gold Coast Legislative Assembly on 1 March, 1954,

"In formulating its policy the Government has accepted the fact that it will be many years before the Gold Coast will be in a position to find from its own resources people who can combine capital with the experience required in the development and management of new enterprises. It is, therefore, apparent that the Gold Coast must rely to a large extent on foreign enterprise and the Government is anxious to give it every encouragement."

Despite Nkrumah's constant war of words against colonialism and neo-colonialism, in practice foreign interests in the country found the government sympathetic. And indeed, when the gold mining industry faced its major crisis in 1961, when some of the mines threatened to close down, as one writer stated,

"... their assets were acquired on the London Stock Exchange by the Ghana Government in a takeover bid whose orthodoxy and propriety were equal to any similar operation by the most staid British capitalist enterprises and differed from such only in the more generous terms it accorded to the retiring shareholders" (Bing, 1968, pp.12-13).

CONCLUSION

From this brief survey it emerges that the various factors in mineral exploitation vary in importance through time and space according to the value man sets on known mineral deposits, and according to local circumstances. Gold is unique in many ways, since its development has always attracted men and money, regardless of the difficulties of its exploitation. In the case of the gold mining industry in Ghana, the initial constraints posed by the environment were soon eclipsed by the problem of obtaining labour, and this problem has never been resolved satisfactorily despite the efforts of the mining companies to stabilise labour by providing a wide range of welfare, housing and recreational facilities. In the recent period, economic factors have come to dominate the industry, in Ghana and elsewhere, where the inflation in working costs has forced the industry to contract spatially. Ultimately the survival of gold mining throughout the world depends on the ability of technological progress to cheapen the winning of gold, since it is expected that there will be an ultimate limit to the financial support which the governments of the producing countries are willing to give to the producers.

In Chapter 2, the geological basis to gold mining in Ghana is discussed as it determines the geographical distribution of the gold mines, and the practical mining problems which derive from the geological characteristics of the gold deposits in Ghana are also reviewed.

CHAPTER 2

THE GEOLOGICAL BACKGROUND TO GOLD MINING IN GHANAINTRODUCTION

Gold is not a particularly rare element in the Earth's Crust. It can be detected in almost all rocks, having an average concentration of 0,0045 parts per million. It is also present in sea-water in varying quantities up to 0.006 milligrams per ton. Although several processes have been invented to recover gold from the sea, the free market price never rises high enough for long enough periods to permit its extraction (Noakes and Shaw, 1969, p.235). The same economic constraint limits its exploitation from the more conventional type of deposits. In nature, gold rarely occurs in a pure form. It is generally associated with silver and other minerals of the platinum group. Consequently, most of the world's gold is obtained from what is known as 'native' gold, or the metallic mineral which is predominantly gold. When the silver ratio is high, the mineral alloy is called 'electrum' which is paler in colour than native gold, which is very strongly yellow. The second most important source of gold is the gold tellurides, mainly calaverite, with a 39% gold content, and sylvanite and petzite. Thirdly, some gold is also recovered as a by-product from polymetallic mineral deposits, generally from the base metal ores as copper, lead and zinc (Jones, 1963, p.117).

The economic deposits of gold vary in type from the unconsolidated alluvial deposits of the Yukon, from which visible gold can easily be separated by simple washing, to the conglomerate reefs of South Africa, in which the gold is so finely disseminated that it can

be recovered only by chemical treatment, and to the auriferous quartz lodes of such famous mines as the St John del Rey in India and the Ashanti mine in Ghana. Gold is therefore won from three types of deposit: from alluvial or placer deposits, from conglomerates or 'bankets', and from veins or lodes.

Auriferous gravels were the chief source of the world's gold supply until recently, and they still produce some 20% of the world output. Because of its insolubility and high specific gravity gold occurs unaltered and concentrated in such deposits. The gold in placers was derived from the weathering of veins which outcrop on the surface of the ground to form 'eluvial' deposits in situ, or 'alluvial' deposits where the material has been transported by water and deposited at lower levels. Owing to the high density of gold, the richest auriferous gravel is generally located at the bottom of the deposit and, depending on the amount of weathering, gold occurrences in placers vary from minute grains to large nuggets in size.

The second type of deposit, where the gold is found in conglomerate bands or bankets, is essentially similar to placers in origin but with the major difference that they are found below the surface, covered by newer layers of sedimentary rocks, or lava flows. All authorities concur on the origin of these conglomerate bands, as found in South Africa and parts of Ghana, but not all geologists agree on the genesis of the gold disseminated through the matrix. Some believe the gold is contemporaneous with the conglomerate, while others believe the gold is younger, having found its way into the conglomerate beds as the result of infiltration by mineralising solutions which also deposited the pyrite with which gold is generally associated.

The third type of deposit, the auriferous quartz vein, is more often than not located close to granitic bodies. The most favourable areas for such mineralisation are generally near the contact of small granitic intrusions which protrude upwards from a massive batholith. Gold-bearing quartz veins are among the most productive of all gold deposits, although in many cases the gold is found enclosed in sulphide minerals as pyrite, arsenopyrite, pyrrhohtite and chalcopyrite, which makes its recovery more difficult, while in other ores the gold is visible to the naked eye.

GOLD IN AFRICA : THE CONTINENTAL SETTING

The African continent is distinguished by extensive mineralised regions; Nicholas De Kun recognises ten regions, all Pre-Cambrian in age, and these are divided by younger basins and tectonic zones (De Kun, 1965, p.215). Gold is one of the most widely spread minerals in Pre-Cambrian Africa, although it is found localised in commercial quantities in only four of the ten mineralogenetic provinces; High Africa, containing the South African, Rhodesian and Zambian gold; Eastern Africa, containing the smaller Tanzanian deposits; the Atlantic Rim, with the gold of Gabon; and the Guinean Shield, the largest deposits of which are in Ghana (Map 2.1).

The principal commercial deposits are the bankets, those of South Africa being 2000 million years old, while the much less extensive bankets in Ghana are 1800 million years old. The minor occurrences, more widespread geographically than the bankets, are found as veins or placers eroded from them in other parts of Africa. The auriferous veins are older geologically than the bankets, ranging from 2200 million years in Ghana, north-eastern Congo and Rhodesia to over 3300 million

MAP 2-1



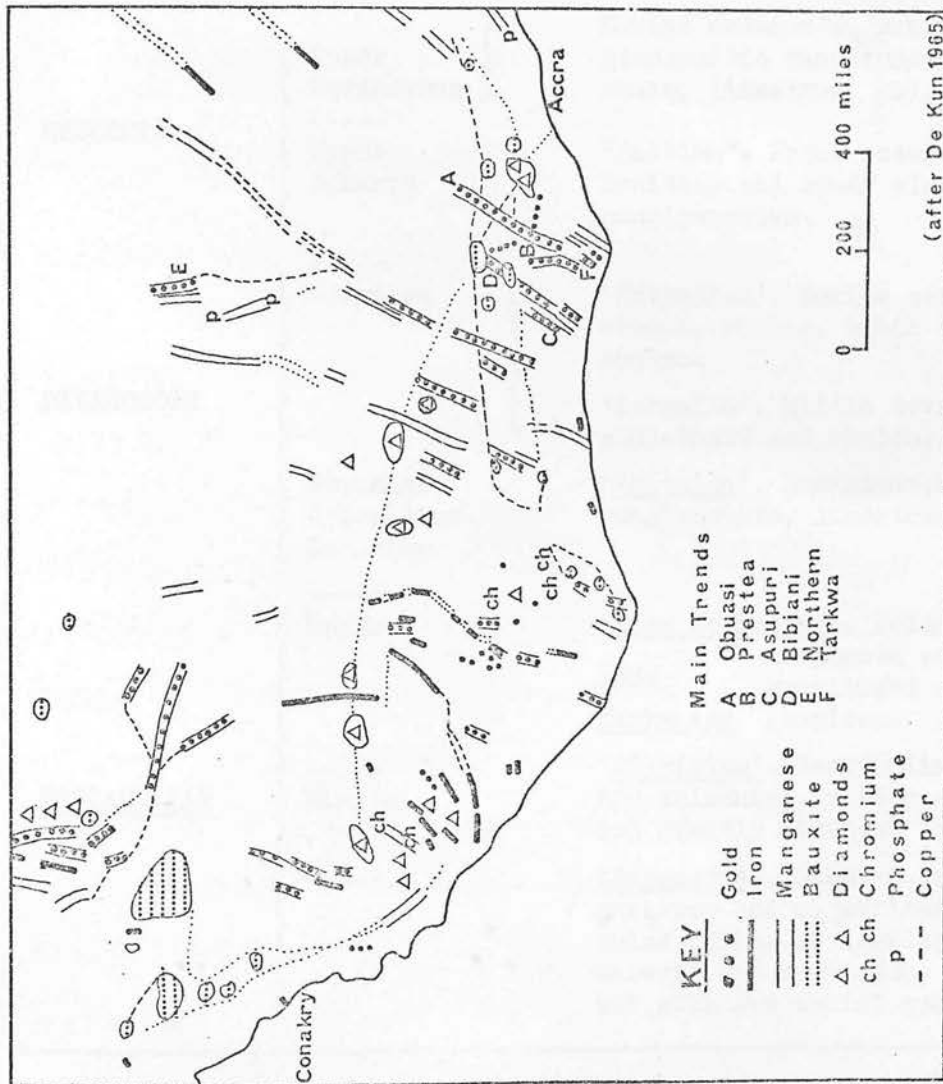
years in Tanzania and elsewhere. South Africa holds some 92% of the continent's known reserves, and it is expected that they will be sufficient to last to the end of the twentieth century. The Congo, Rhodesia and Ghana each contain 2% of African reserves, and Tanzania 1%. Few realistic data are available on gold reserves, estimates varying between 500 and 1000 million ounces, or 17000 and 34000 tons of ore (De Kun, 1965, p.6).

GOLD IN THE GUINEAN SHIELD : THE REGIONAL SETTING

Ghana belongs geologically to the Guinean Shield, which stretches from Conakry to Accra, averaging 400 miles in width. The shield consists of gneisses, granites and middle Pre-Cambrian meta-sediments, with the structural axes trending north-north-east and distinguished by iron, manganese and gold deposits (Map 2.2). The main zone of mineralisation is much less extensive, running from Freetown to Accra averaging some 200 miles wide. De Kun recognises four distinct provinces, each characterised by its own particular group of economic minerals. These are Togo, distinguished by chromium and iron; Liberian, distinguished by iron, bauxite and gold; the Diamond Arc, which effectively marks the northern limits of the mineralised zone; and Ghanaian, featuring gold, manganese, and bauxite deposits (De Kun, 1965, pp.229-230).

The Ghanaian province occupies a 250-mile band from Grand Lahou in Cote d'Ivoire to Takoradi in Ghana. It is made up of arenaceous sediments, of the lower Birrimian (see Table 2.1), which are set in compact folds, and interlayered metasediments and volcanics of the upper Birrimian formation. Gold is located in fissures of several contacts, the principal trends being Obuasi, Prestea, Asupiri

MAP 2.2



KEY

- Gold
- ||||| Iron
- ||||| Manganese
- ||||| Bauxite
- △ △ Diamonds
- ch ch Chromium
- P Phosphate
- Copper

Main Trends

- A Obuasi
- B Prestea
- C Asupuri
- D Bibiani
- E Northern
- F Tarkwa

(after De Kun 1965)

THE MINERAL RESOURCES OF THE GUINEAN SHIELD

TABLE 2.1

TABLE OF GEOLOGICAL SUCCESSION IN GHANA

QUATERNARY	Recent	Unconsolidated clays and sands of lagoons, delta and littoral areas.
TERTIARY	(Upper Tertiary	Partly consolidated red continental deposits of sandy clays and gravel.
	(----- (Eocene	
MEZOZOIC	(Upper Cretaceous)	Marine sediments, sandstone, glauconitic sandstones, clay and shale, limestone, oil, sand.
	(----- (Upper Jurassic	"Amisian". Fresh water series of bouldery and sandy clays and conglomerates.
	(----- (Devonian)	'Sekondian'. Marine series of sandstones, shales, black sulphurous shales.
PALAEOZOIC	(----- (Devonian)	'Accraian'. Middle Devonian only, sandstones and shales.
	(Silurian (Ordovisian (Cambrian	' <u>Voltaian</u> '. Sandstone, shale, mudstone, conglomerate, limestone tillite.
	(----- (Upper	' <u>Buem formation</u> '. Folded and metamorphosed sediments. Not <u>Togo</u> granitized or intruded by <u>Tarkwaian</u> granites.
<u>PRECAMBRIAN</u>	(----- (Middle	' <u>Birrimian</u> '. Geosynclinal sediments and volcanics, partly granitized and greatly intruded by granites.
	(----- (' <u>Dahomeyan</u> '. Massive crystalline gneisses and migmatites representing thick series of argillaceous, calcareous and arenaceous sediments, but with few schist remnants.

Note: ----- = unconformity.

Source: B.A.Bates, in Wills(ed.), Agriculture and Land Use in Ghana, 1962.

and Bibiani (a,b,c and d respectively, on Map 2.2). Another alignment connects Abidjan with Boundoukou, bifurcating into a north-eastern, lower Birrimian branch and a northern series of lenses (e, on Map 2.2). In Ghana, gold is also found in Tarkwaian formations, where the strata have been folded into a large syncline, with the gold occurring in conglomerate bands of the structure (f, on Map 2.2). The distribution of manganese and bauxite is similarly associated with Birrimian rocks and located variously in Ghana, Cote d'Ivoire and Upper Volta.

GOLD IN GHANA : THE LOCAL SETTING

1. Progress in Geological Investigations in Ghana

Knowledge of the geology of Ghana as a whole was first stimulated by interest in the distribution of gold, which had long been one of the main articles of trade between the natives and European merchants. This trade was confined to the beaches, and few Europeans had ventured inland before the annexation of the Colony in the nineteenth century. Prior to 1860, therefore, very little was known of the geology of the country except for a few descriptions of the rocks near the coast. Indeed, although the first gold mining concessions were taken out as early as 1877, it was not until 1890 that the first geological reports of any significance were published. In that year, two important papers drew attention to the economic potential of the Gold Coast, as it then was, as a source of minerals. The first contained a description of the geology and mineralogy of the Tarkwa banket deposits which the author recognised as similar to those of the Rand (Halse, 1890). The second paper was a more general description of the geology of the eastern part of the Colony and Ashanti, but it contained notes on the location of economic minerals and forecast the

important role which they were later to play in the economic development of the country (Ferguson, 1890).

The turn of the century witnessed a virtual 'boom' in the granting of gold mining concessions, which led to a marked increase in the knowledge of the Tarkwa goldfield in particular. Consequently, the first decade of the twentieth century produced a series of geological papers on the distribution and genesis of the gold deposits in Ghana, notably by Sawyer (1902), Truscott (1902) and Collins (1909). The Gold Coast Geological Survey (G.C.G.S.) was established in 1913 and, up to 1925, its work was largely concerned with reconnaissance surveys, prospecting for minerals, and water investigations. In 1925, the geological mapping of the Tarkwa goldfield was begun, and Bulletin No.1 of the G.C.G.S. was published, outlining the mineral and power resources of the country as known up to that time (Kitson, 1925). With the increase in the price of gold in 1931, the gold mining industry was given a new impetus, and the G.C.G.S., anxious to assist the further development of the industry, concerned itself in the 1930s with a comprehensive survey of the gold resources of the Gold Coast, the results of which were published in a series of bulletins and memoirs, notably by Whitelaw (1929), Kitson and Felton (1930), Junner (1932), Cooper (1934), Junner (1935), Hirst (1938), Junner and Service (1942) and Hirst and Junner (1946). During these investigations, other economic mineral deposits were discovered and mapped. In relation to gold, it is significant to note that no new gold deposits have been discovered outside the areas worked by the natives in the years before the arrival of European mining companies.

It is very evident, from a survey of the literature of both private individuals and the official papers of the local Geological

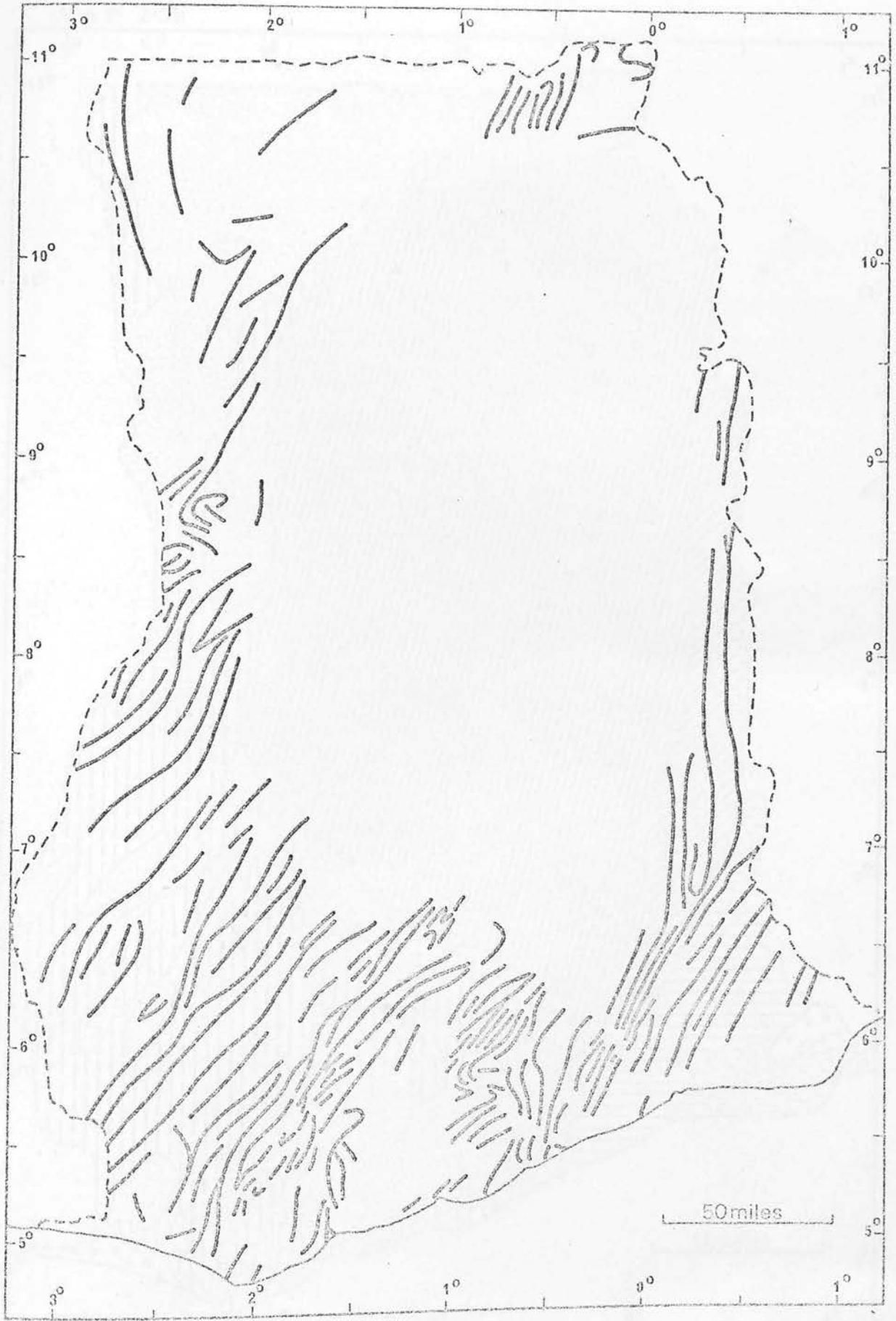
Survey department, that knowledge of the general geological background of Ghana was derived incidentally to research into the distribution of economic minerals and the distribution of gold in particular. The total expenditure of the G.C.G.S. from 1913 to 1943 was a mere £225,000 (Junner, 1946), a remarkably small figure in relation to the wealth of knowledge that department had built up in the thirty years of its existence to 1943. It is equally remarkable when it is remembered that much of the southern part of the country is thickly covered by High Rain Forest, and that the transport network was and still is poorly developed over much of the country.

2. Economic Geology

The relationship between Pre-Cambrian orogenies and metalliferous mineral deposition is very clearly demonstrated in Ghana (Map 2.3). The lines of past folding, trending in a north-north-easterly direction effectively outline the areas over which the Pre-Cambrian formations are exposed in Ghana, and, with a few minor exceptions, these are coincident with the distribution of all the known metallic mineral deposits in the country.

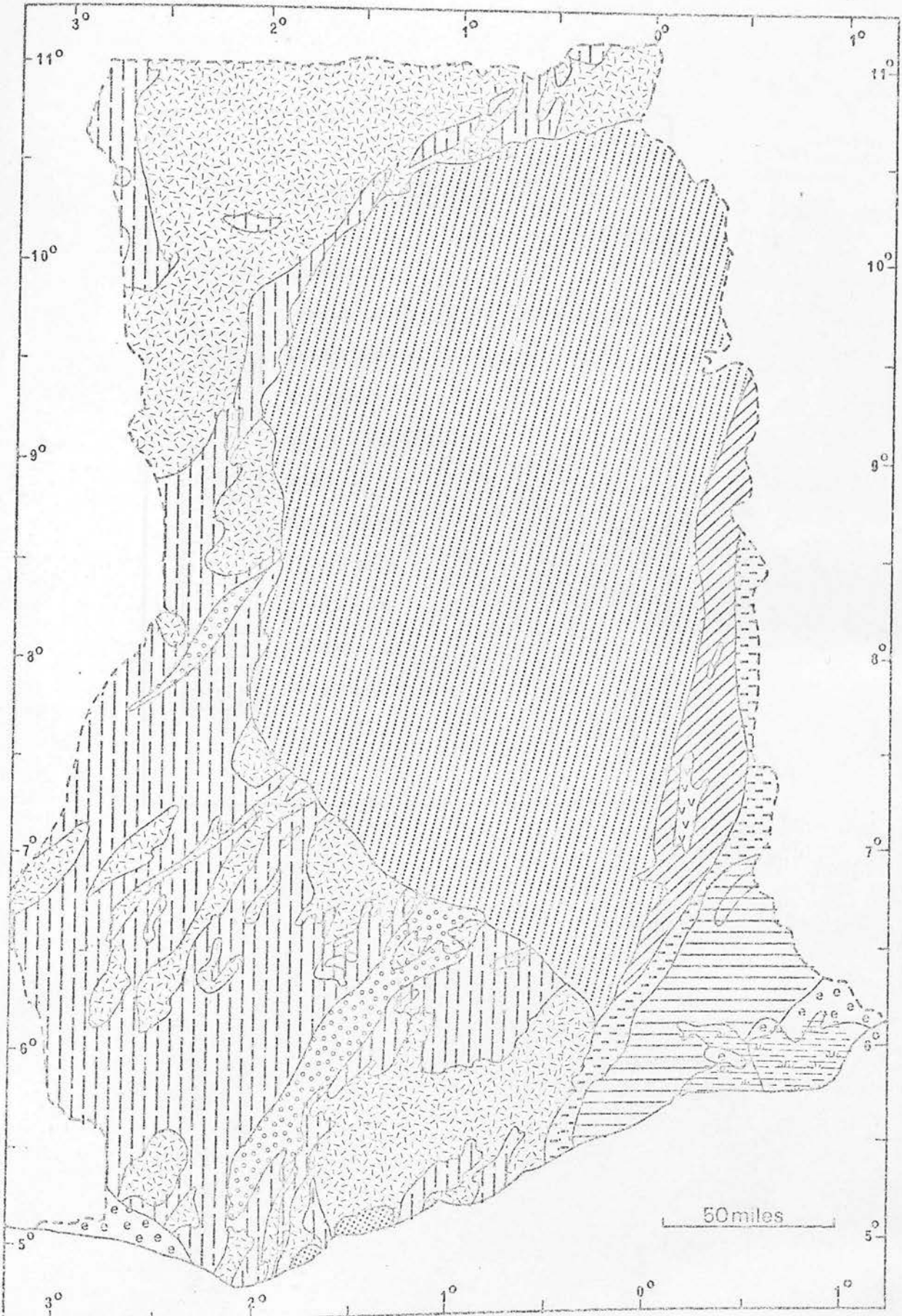
Ghana can be divided into three main geological regions, based on the age of the rock formations. First, the lower and middle Pre-Cambrian systems, made up locally of the Birrimian and Tarkwaian rock suites, cover the central south and west of the country. Secondly, the upper Pre-Cambrian formation, consisting of the Buem and Togo series, lies on the eastern margin of Ghana. Thirdly, the Voltaian system, which covers about 45% of the entire surface area of Ghana, is exposed in the centre and north, presumably overlying the extension of the Pre-Cambrian shield complex.

MAP 2-3a



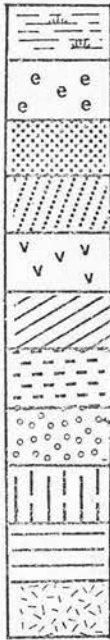
TREND LINES OF PAST FOLDING

MAP 2-3b



GEOLOGY

KEY TO MAP 2:3b



RECENT

TERTIARY, EOCENE & CRETACEOUS

SEKONDIAN & ACCRAIAN

VOLTAIAN

BUEM VOLCANICS

BUEM

TOGO SERIES

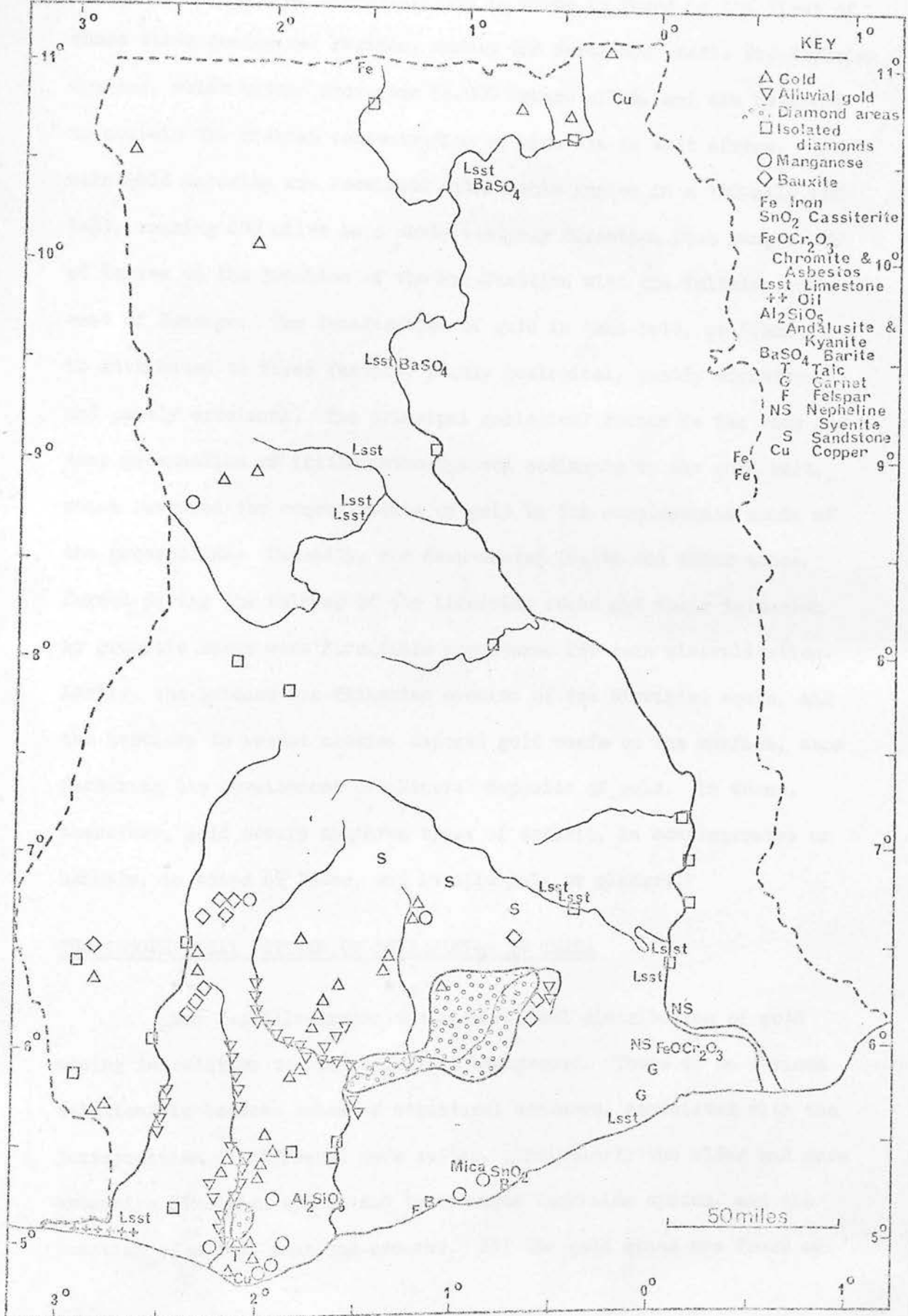
TARKWAIAN

BIRIMIAN

DAHOMEYAN

INTRUSIVES

MAP 2-3c



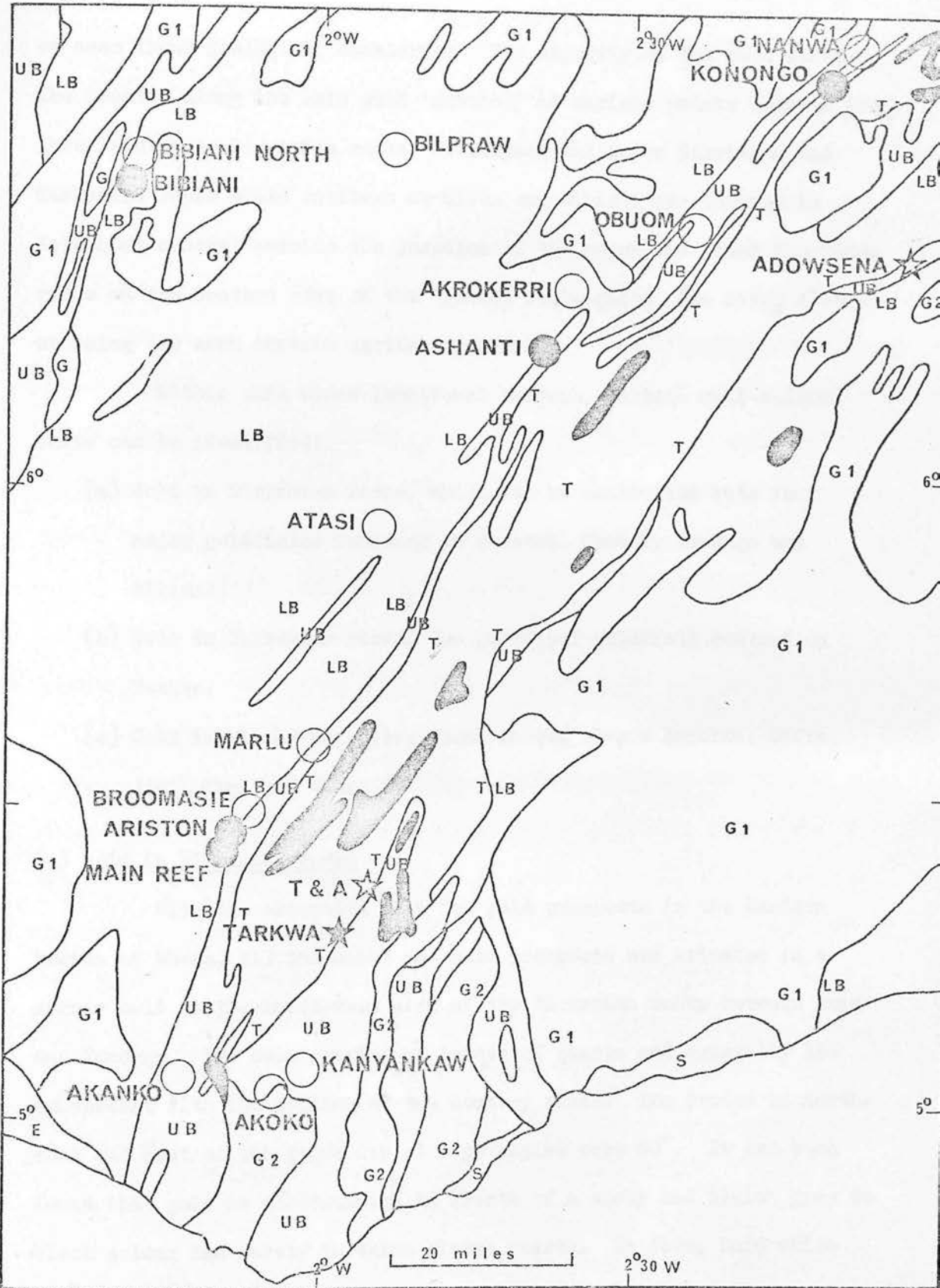
MINERAL DEPOSITS

The zone of mineralisation in Ghana is found in the first of these three geological regions, namely the lower and middle Pre-Cambrian systems, which extend over some 54,000 square miles, and are believed to contain the richest concentration of minerals in West Africa. The main gold deposits are localised within this region in a 100-mile wide belt, running 200 miles in a north-easterly direction from just south of Tarkwa to the junction of the Pre-Cambrian with the Voltaian rocks east of Konongo. The localisation of gold in this belt, or 'channel', is attributed to three factors, partly geological, partly structural and partly erosional. The principal geological factor is the wide and deep geosyncline of little metamorphosed sediments in the gold belt, which favoured the concentration of gold in the conglomerate bands of the geosyncline. Secondly, the deep-seated faults and shear zones formed during the folding of the Birrimian rocks and their intrusion by granitic rocks were favourable structures for vein mineralisation. Lastly, the intense pre-Tarkwaian erosion of the Birrimian rocks, and the tertiary to recent erosion exposed gold reefs on the surface, thus favouring the development of alluvial deposits of gold. In Ghana, therefore, gold occurs in three types of deposit, in conglomerates or bankets, in veins or lodes, and in alluvials or placers.

THE GEOGRAPHICAL PATTERN OF GOLD MINING IN GHANA

Map 2.4 illustrates the geographical distribution of gold mining in relation to the geological background. There is an obvious relationship between zones of structural weakness, associated with the juxtaposition of different rock suites, particularly the older and more extensive Birrimian system and the younger Tarkwaian system, and the location of mines, past and present. All the gold mines are found on

MAP 2-4



GEOGRAPHICAL DISTRIBUTION OF GOLD MINES

- LODE MINES PRODUCING
- LODE MINES CLOSED
- ★ BASKET MINES PRODUCING
- ☆ BASKET MINES CLOSED

- E Eocene
- S Sekondian
- T Tarkwaian
- UB Upper Birrimian
- LB Lower Birrimian
- Basic Intrusives
- G1 & G2 Granite complexes

or near these geological boundaries. The majority of the gold mines are located along the main gold 'channel' at various points between the lower and upper Birrimian rocks, or between the upper Birrimian and Tarkwaian rocks while outliers at Siwum and Bibiani are located in 'offshoot cracks' astride the junction of the upper and lower Birrimian rocks on the western edge of the 'golden rectangle'. The river systems crossing the area contain auriferous gravels.

Within this broad locational pattern, certain well-defined belts can be identified:

- (a) Gold in Birrimian rocks, which can be subdivided into four major goldfields focusing on Prestea, Obuasi, Konongo and Bibiani.
- (b) Gold in Tarkwaian rocks, the principal goldfield centred on Tarkwa.
- (c) Gold in placer deposits, found in the rivers Ancobra, Offin, Jimi, Prah and Tano.

(a) Gold in Birrimian rocks

With the exception of a few gold prospects in the Eastern region of Ghana, all the mines and gold prospects are situated in a narrow belt on the north-west side of the Tarkwaian rocks between Axim and Konongo. The ores consist of lenses of quartz and generally lie concordant with the bedding of the country rocks. The strike is north-east and most of the reefs dip at high angles over 60° . It has been found that gold is disseminated in quartz of a smoky and bluish grey to black colour and rarely in white glassy quartz. In fact, hard white quartz is usually barren. In several places the gold is locked up in pyrite, and it is often difficult to detect gold in unweathered ores

of this type except by assay. Displacements due to faulting are seldom of sufficient magnitude to cause trouble in following the reefs underground.

The Prestea goldfield stretches over 30 miles from Fura, south-west of Prestea, to Insu. The importance of this belt for the exploitation of gold derives from the great strength and persistence of the ore bodies. The main reef channel follows the contact zone of the Birrimian and Tarkwaian systems at the southern end of the goldfield, and the junction of the upper and lower Birrimian rocks toward the northern end of the belt. The detailed geology of the Prestea goldfield is described in G.C.G.S. Memoir No.3 (Cooper, 1934).

The Prestea goldfield has been worked commercially since the late 1880s, by a number of mining companies, notably Ariston Gold Mines (1929) Ltd, and Gold Coast Main Reef Ltd; these were amalgamated in 1963, and thereafter known as Prestea Goldfields. The third most important company that has worked in this belt is Marlu Gold Mining Areas Ltd, which closed in 1955. Between 1912 and 1963, the mines of Gold Coast Main Reef produced 1,017,023 ounces of gold, from 2,605,578 tons of ore. This produced a total revenue of £10,947,097. Over the same period, the mines of the Ariston company produced gold to the value of £35,569,582; this represented the milling of 11,376,123 tons of ore, yielding 3,972,248 ounces of gold. From their amalgamation in 1963, their combined production up to 1967 was 536,967 ounces of gold, valued at £5,818,687. The output of the Marlu mines from 1912 to 1955 came in between that of Ariston and Main Reef, at 923,913 ounces of gold, valued at £8,453,998, this amount being derived from 7,539,039 tons of ore.

The Obuasi goldfield extends 15 miles from Akrokkerri to the south of Sansu. The main lodes are some $2-2\frac{1}{2}$ miles from the contact of the Birrimian and Tarkwaian rocks. In terms of gold content, this belt has been called the 'bonanza' belt, owing to the consistently high values obtained from the main lodes. Details of the geology of the Obuasi goldfield can be found in G.C.G.S. Memoir No.2 (Junner, 1932).

Apart from the Akrokkerri mine which had a short life from 1900 to 1909, this belt has been the domain of Ashanti Goldfields Corporation Ltd, for nearly three-quarters of a century; the company was registered in 1897, and obtained by special agreement a 100 square mile concession, with both the mining and timber rights to this extensive area. This has proved to be the richest section of all the gold mining regions in Ghana, producing 10,687,888 ounces of gold, from a mere 11,663,553 tons of ore, between 1912 and 1966. This produced a gross revenue to the company of £98,834,403 over the 54 years in question. Early in 1969, the assets of the original company were sold to Lonrho for some £15,000,000, and the Ashanti mines continue to increase their output annually. It is believed that this mine is the richest in the world for its size.

The Konongo goldfield is situated at the north-eastern extremity of the main gold 'channel', and the lodes are located in Birrimian rocks within one-third of a mile of the boundary with the Tarkwaian system. The richest reef, in fact, is located almost on the contact between these two rock suites, and in this respect it is similar in location to the main reef at Prestea. The persistence of the reefs in similar positions, parallel to the strike of the country rock, indicates that they are situated in a strong fracture-zone (Junner, 1935, p.35). The geology of the area is described in detail in G.C.G.S. Bulletin No.14 (Hirst, 1942).

Two mining companies, Lyndhurst Deep Level (Gold and Silver) Ltd, and Konongo Gold Mines, have been largely responsible for the exploitation of this belt. The former company was in existence for only 7 years, between 1949 and 1956, whence its assets were bought by the latter company, Konongo Gold Mines, which still operates as a subsidiary of the State Gold Mining Corporation, of which it became a part in 1965. The combined output of these two companies (and their predecessors earlier) between 1912 and 1966 was 1,386,669 ounces of gold, valued at £14,657,407.

The fourth and last major goldfield in Birrimian rocks is the Bibiani goldfield, located some 100 miles to the west of the main gold 'channel' in an 'offshoot crack', or fissure, at the junction of the upper and lower Birrimian systems. The main ore bodies are regarded as saddle reefs formed in low pressure areas beneath porphyry dykes (Cooper, 1934, p.16). The richest ore is invariably associated with sheared and crushed zones cutting through the original hard quartz, the bulk of which is rather low grade and characterised by a patchy distribution of gold. Commercially, therefore, this belt has proved less profitable than the reefs located along the main gold 'channel'. This field has been worked largely by one company, Bibiani (1927) Ltd, which became a subsidiary of the S.G.M.C. in 1961, and is very nearly at the end of its life. Between 1912 and 1966, the mines of Bibiani produced gold to the value of £22,725,079 from 9,187,975 tons of ore. The geology of the Bibiani goldfield is described in G.C.G.S. Memoir No.9 (Hirst and Junner, 1946).

(b) Gold in Tarkwaian rocks

Gold is widely disseminated throughout the Tarkwaian system, where the ore is an auriferous conglomerate, termed basket. The gold-

bearing conglomerate bands occur in the lower strata of the Tarkwaian series about 1500 feet above the Kawere conglomerate band at the base of the series. The gold-bearing conglomerate band can be traced discontinuously over 120 miles between Bonsa and Konongo in the Tarkwaian geo-syncline. The series is highly faulted, and the beds are overturned in many places. Consequently, the banket is far from continuous and structurally more complex than the vein deposits in the Birrimian rocks. The distribution of gold is irregular and high values occur in patches rather than shoots, although it is more finely divided than the gold in the Birrimian reefs, one of the main arguments favouring the placer theory of origin of the gold in the Ghana bankets (Junner, Hirst and Service, 1942, p.65).

The Tarkwa goldfield, running for 26 miles between Iduapriem and Damang, is the only section of the entire 120-mile long Tarkwaian system which has been exploited for gold. Its commercial exploitation dates from the late 1870s; indeed, this area was the springboard from which commercial mining later spread. Ore is found on all the limbs, crests and troughs of the folds in the geosynclinal structure. The known ore bodies are richest in gold content on the eastern edge of the goldfield, toward the boundary between the Tarkwaian and lower Birrimian systems, and there is a progressive diminution of values westward. The bulk of the gold is associated with detrital hematite, the absence of which generally indicates barren patches. Dozens of companies have worked the banket from time to time, although the low grade of the deposits in general forced the amalgamation of adjacent properties. Of the many companies involved in the Tarkwa belt, two companies in particular have been largely responsible for its exploitation. These are the Taquah and Abosso Mines Ltd, and

Amalgamated Banket Areas Ltd. The former closed down in 1955 after having produced from 1912, gold to the value of £18,959,167 from 8,584,466 tons of ore which yielded 2,708,032 ounces. The latter company is still in existence, being one of the companies bought by the State in 1961. From 1912 to 1966, 15,294,606 tons of ore were milled, yielding 3,246,762 ounces of gold, valued at £31,448,076. Details of the geology of the Tarkwa goldfield can be consulted in G.C.G.S. Memoir No.1 (Whitelaw, 1929), G.C. G.S. Bulletin No.10 (Hirst, 1938), and in G.C.G.S. Memoir No.6 (Junner, Hirst, and Service, 1942).

(c) Gold in placer deposits

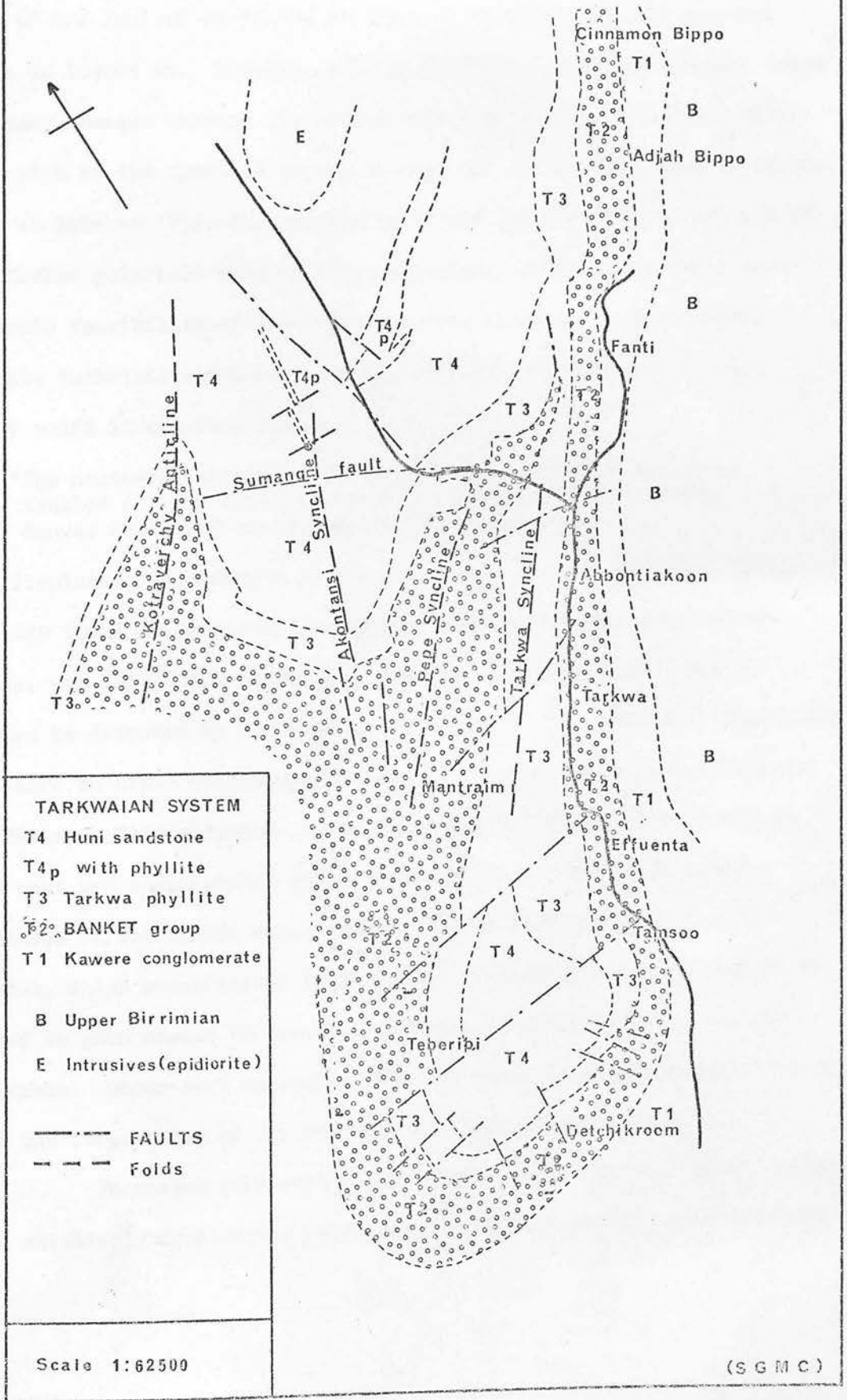
Auriferous gravels are found in varying quality in all the rivers, and their associated alluvial flats, which traverse the gold-bearing Birrimian and Tarkwaian rocks. The principal rivers which have been exploited commercially for gold are the Ancobra, Fura, Offin, Birim, Prah, Jimi and Tano. Dredging was continuous from 1902 to 1925 when all operations ceased, owing more to the inefficiency of the dredges than the lack of payable deposits. Gold-dredging operations recommenced, however, in the late 1930s, notably by the Bremang Gold Dredging Company, which first re-worked the Ancobra river from Prestea northwards, and later transferred its dredges to the Offin and Jimi river valleys where the company's four dredges are currently operating. Up to 1966, the Bremang company's dredges had treated 199,458,841 cubic yards of auriferous gravel, which produced 1,040,854 ounces of gold, valued at £11,980,359.

PRACTICAL MINING PROBLEMS

The geological and structural characteristics of the gold deposits in Ghana give rise to several problems in the discovery, mining and treatment of the ores. All three types of deposit, the bankets, the quartz veins and the alluvials, have certain peculiarities which pose technical problems to the geologist, mining engineer and the metallurgist.

Of all the geological characteristics of the banket, the one which has the most far-reaching implications for mining is the highly-faulted nature of the series (Map 2.5). The reefs are displaced by distances ranging from a few feet to hundreds of feet, and it is rare to find unbroken stretches of reef of more than 200 feet. There is an infinite variety of faults which have been classified into three groups, as found at the Abbontiakoon mine on the property of Amalgamated Banket Areas Ltd. These are overlap faults, which are reverse strike faults parallel to the strike of the reef; underlap faults, lying normal to strike; and steeply dipping transverse faults, which are often nearly normal to the strike of the reef (Junner and Service, 1942, p.40). The Sumang-Fanti overthrust fault may be taken as an illustration of the difficulties such faults pose for mining. It is located in the north of the mine and has produced overlaps of hundreds of feet. Very long cross-cuts would be required to reach the gold-bearing band displaced by this fault, and the cost would be out of all proportion to the expected returns. In addition to the several faults in the banket, there is widespread sheering following the dip of the reef, and occurring not only along its footwall, where it is most common, but also within the reef or its walls. (See Appendix I for an explanation of technical terms as used in Ghana.)

TARKWA GOLDFIELD
FAULTS



From the mining point of view, the faulted and folded beds in the syncline are a mixed blessing for although they cause repetitions of the reef they are often difficult to follow and it is easy to miss some of the faulted or folded portions of the reef when driving out lines to locate it. Equally, dips in the blanket are not regular; there are many changes through the series from a dip of less than 30° on the east limb of the syncline to one of over 90° on the west limb at Tarkwa. Even as late as 1954, the complexity of the gold-bearing structures of the Tarkwa goldfield were causing pessimistic assessments about the economic feasibility of developing certain sections of the blanket, despite technical advances in mining methods. For example, of the Fanti shaft it was said that,

"The northern section of the mine is too badly faulted to be tackled at this time, if ever" (Amalgamated Blanket Areas, Annual Report of the Directors, 1954, p.6).

The displacements create a practical problem for the geologist also, in that there is frequently a juxtaposition of several conglomerate bands, not all of which are gold-bearing. The true blanket cannot always be detected by the naked eye because of the 'apparent' similarity it bears to other conglomerate bands, the so-called 'x' and 'y' bands at Tarkwa. This situation has caused much 'off-reef' development in the past and a consequent wastage of capital. Other problematic features of the blanket concern the narrowness of the reef in many places, which means that a large volume of waste or 'gangue' has to be mined to gain access to the gold, and the variable width of the pay channels. Under such circumstances, the planning of forward production and the forecasting of ore reserves are made more difficult.

In marked contrast to the blanket, the auriferous quartz veins are relatively fault-free. However, the lode mines have their own set

of problems, the most significant one being the occurrence of graphite in the hanging and footwall sections of the reefs. Graphite has in fact been described as the 'bete-noire' of the quartz mines (Eaton Turner, 1928), since the weak walls of graphite, which surround the veins as a selvage of loose material, are not self-supporting. This makes mining conditions dangerous. Indeed, to prevent caving in, it is often necessary to leave part of the gold-bearing quartz vein intact; an official of the Prestea company confirmed that as much as 9 inches of reef may have to be left intact as support, which of course means leaving much valuable gold in the ground. Otherwise, special stoping methods have to be adopted, such as 'close-setting' and 'back-filling', a method which increases the timbering requirements.

The quartz mines suffer from other practical mining difficulties arising from the geological nature of the veins. In the first instance, not all quartz emplacements are gold-bearing. In addition, the ore shoots tend to be of variable width and strike length, which reflect on mining costs, and indeed mining methods. For example, at Bibiani the main ore-body is remarkable for its magnitude, attaining a width of some 200 feet in places. Mass mining techniques are therefore appropriate and economic. By contrast, the Odumase ore-body (the principal reef at Konongo) although attaining a strike length of 1600 feet in the upper levels of the mine, pinches out to three relatively narrow stringers below the tenth level. Of equal significance in affecting mining costs and methods is the fact that there are many spurs and offshoots from the main ore-body, a feature which increases the length of drives and cross-cuts required to reach them. Whatever the dimensions of the reefs in the quartz mines, the gold values are found to be erratically distributed. Indeed, zones of

impoverishment are characteristically interposed with zones of enrichment throughout the quartz mines. This increases mining costs substantially, since zones of unpayable, barren reef have nevertheless to be worked in order to reach the payable sections. The nature of the Obuasi reef, on the Ashanti mine, may be taken to illustrate this point. At a depth of 500 feet the values were found to be poor, but enrichment of the reef encountered at level 3 continued down to levels 6 and 7, where values once again pinched out; the grade was found to increase again at level 9 and continued in the same tenor down to level 19, below which progressively poorer values showed. This example also serves to illustrate the lenticular nature of the quartz deposits. The pay bands vary also in width, and it is only with recent improvements in mining methods that many of the small but high-grade pockets of ore have become accessible. The uncertain direction of the reefs in many places adds to the amount of lateral development necessary to define them, and this also reflects on the cost of mining in Ghana.

Lastly, the nature of the alluvial gold deposits in Ghana creates problems for their exploitation. Dredging for gold is carried out over entire alluvial flats, but the distribution of values is found to be very erratic. Such a distribution makes accurate forward evaluation difficult, and means that profit margins fluctuate over a wider scale than in underground mining, where it is possible to maintain a pre-determined level of profit by 'mixing' high-grade ore with low-grade ore taken from different working places within the mine. With dredging, on the other hand, the gravel has to be treated as it comes, regardless of its value, as the dredge moves along the valley. In addition, the river courses in Ghana are spotted with rockbars, which can demand the total dismantling of the dredge and its re-erection on

the other side of the obstruction if there is no other way of circumventing it, or if the bar cannot be blasted. Much potentially valuable dredging ground has been left intact in Ghana because of such situations. For example, when the Bremang Gold Dredging Company moved their dredges from the Ancobra river to new grounds in the Offin valley in the late 1950s, the original plan was to set up the dredges to the south-east of Dunkwa, where high values are known to occur. However, the valley floor is so badly interrupted by natural obstructions that dredging in that area would have been costly, if not physically impossible, and the plan was abandoned; the dredges were set up in the Offin valley to the north-west of Dunkwa where the river valley is relatively free of such barriers. Another feature of the alluvial deposits which adversely affects the profitability of gold dredging in Ghana is the nature of the overburden which in places is stiff and heavy clay. This slows down the stripping operation and reduces the throughput of the dredges. The occurrence of diamonds in the auriferous gravels does not compensate for the poor values encountered because all but the largest stones are lost owing to the inability of the company to raise sufficient capital from profits to adapt the dredges for the simultaneous recovery of diamonds. The seasonal variations in the river levels affect the continuity of production, adding a further economic constraint to gold dredging in Ghana.

CONCLUSION

Within the limits of present knowledge of the geology of Ghana, the Pre-Cambrian complex exposed in the south and west of the country contains all the deposits of economic minerals. The gold-bearing rocks are concentrated in an area of some 20,000 square miles, in which the geographical distribution of gold mining is related to lines of structural weakness trending in a north-north-easterly direction, in accordance with the general structural trend of the wider Guinean shield.

Gold is extracted from bankets, quartz veins and alluvial deposits, each of which has certain characteristics posing practical mining problems which affect the economics of gold mining.

In the world context, Ghana is a minor producer of gold with an average annual output over the last decade of under one million ounces. Equally, Ghana's gold is won at a high price compared to other gold-producing countries, related in no small measure to the comparatively small size of the main goldfields and to the difficulties encountered in their exploitation, derived, inter alia, from the facts of geology. But, while its role in world mining is insignificant, gold has been and continues to be important in the economy of Ghana; in Parts II and III of the study, the historical and contemporary importance of gold mining in Ghana are respectively discussed.

THE HISTORICAL PERSPECTIVE

The historical perspective of the steel industry in the United States is a complex one, involving a long and varied history of production, distribution, and consumption. The industry's growth and development have been shaped by a variety of factors, including technological innovation, government policy, and market forces. The steel industry has played a central role in the industrial revolution and the subsequent economic growth of the United States. Its products have been essential to the construction of infrastructure, the manufacturing of machinery, and the production of consumer goods. The industry's history is a testament to the power of human ingenuity and the resilience of the American economy.

PART II

THE HISTORICAL PERSPECTIVE

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PART II : INTRODUCTION

"The economic development of most African countries until the second world war took the form of the growth of exports, either of agricultural produce or of minerals, to the industrialised countries" (Whetham and Currie, 1969, p.260).

In Ghana, both agriculture and mining provided the basis for the economic development of the country, and their products provided its propulsion to an export-oriented economy. On the one hand, cocoa, introduced into the country in 1879, came to dominate the agricultural sector of the economy and, on the other, gold mining, which began on a commercial basis in 1877, took the lead in the industrial sector, at least up until the second world war. Cocoa farming was developed by peasant farmers and its proceeds provided both the rural community with cash which stimulated the local market for consumer goods, and the local government with revenue, through various forms of taxation, which made development possible. By contrast, the gold mining industry was developed by foreign capitalists, and although the local government drew taxes from the export of gold and thousands of men entered wage-earning employment on the mines, the bulk of the profits from mining were remitted overseas to those countries which supplied the development capital, the mining technology and the managerial expertise. For most of the twentieth century, gold has taken second place to cocoa in its contribution to the value of exports, except for a short period in the late 1930s and early 1940s when, owing to a depression in the cocoa market and a marked increase in the scale of production by the mining industry, gold exports eclipsed cocoa exports by value, and contributed over half the value of domestic exports. Under normal circumstances, however, cocoa is Ghana's leading export, and no change in the relative export value of cocoa and gold is forecast.

In Part II of the study, the problems of the growth and development of the gold mining industry are examined with the objective of assessing the impact of the industry on the economic geography of the country. The historical evolution of gold mining from its early intrusion in 1877 up to 1961, the year in which the State bought five of the seven surviving gold mines, can be divided into four major periods, based on the various problems which faced the industry at different stages in its development. Thus each chapter of Part II is devoted to a discussion of the stimuli or constraints which favoured or hindered the rapid growth of the industry in the periods selected. Although the dividing dates between periods are somewhat arbitrary, in the sense that the impact of particular problems is inevitably linked both forwards and backwards through time, each stage is distinguished by a core of exclusive features, and the industry's role in the economy varies accordingly.

The four periods to be discussed are:

(i) 1877-1901. During these twenty-four pioneering years, the industry struggled to gain a foothold in an environment where the lack of modern transport threatened the very existence of the industry before it had barely begun. Only some 369,000 ounces of gold were produced up to 1901, the peak year for gold exports being 1899, when some 25,000 ounces, valued at £103,000, were produced.

(ii) 1902-1930. The following twenty-eight years were years of consolidation, when the spatial pattern of gold mining reached its maximum extent, fostered above all by the construction of the railway to serve the mining districts. South African capital and expertise were transferred to the Gold Coast, following the Boer War, and these allowed the first large-scale equipment of the gold mines to be

undertaken. The main constraint on progress was the recurrent shortage of labour, which intensified towards the latter part of the period as other sources of employment developed. Gold mining operations were interrupted during the first world war, and it took some time for the industry to recover from this interruption. Gold production was some 6,500,000 ounces over the period, with the peak year in 1914, when some 410,000 ounces of gold, valued at nearly £1,750,000, were exported.

(iii) 1931-1941. Following the United Kingdom's abandonment of the gold standard in 1931, the industry experienced a 'renaissance'.

Exploration, investment and development occurred on a large scale, and long-term programmes for the rational development of the gold mining properties were begun. Production increased dramatically in the 1930s, surpassing all previous production records to reach a peak in 1941-42, when some 882,000 ounces of gold, valued at almost £7,500,000, were exported. In the same year, gold's share of exports by value attained some 53%.

(iv) 1942-1961. Operations were interrupted a second time by a world war, and in the post-war years, the gold mining industry struggled to re-establish its pre-war level of production in the face of inflation in working costs and an unrealistic price for its product. Many gold mining enterprises became uneconomic under these circumstances and closed down. By 1961, only two of the surviving seven gold mining companies had an assured future, and with the threat of the immediate closure of two of the marginal mines, the Ghana Government offered to buy five of the seven gold mines. The offer was accepted, and the seven mines continued to function.

By 1961, gold exports comprised 9.5% of the total value of domestic exports, and the seven gold mining companies employed a labour

force of nearly 20,000. With the entry of the State into the field of gold mining there was, for the first time in the history of the industry, the assurance that the larger part of the revenue from the sale of gold would remain in the country, in contrast to the previous eighty years of gold mining, when the larger share of the profits was repatriated in the form of dividend payments and salaries to expatriate staff employed in the industry. Statistics relating to gold production and labour employed in gold mining can be consulted in Appendices II and III respectively.

In the following chapters, the historical importance of gold mining in Ghana is discussed, beginning with a description of the intrusion of modern mining in the last quarter of the nineteenth century.

CHAPTER 3

THE HISTORICAL PERSPECTIVE:1877-1901 : THE INTRUSION OF MODERN MININGINTRODUCTION : THE FRAMEWORK TO DEVELOPMENT

It was not until 1874 that the British assumed full control of the coastal strip of modern Ghana by annexing it as the Gold Coast Colony. Prior to this, the economy was based on simple techniques and the family labour unit, exchange was of the simplest kind, and transport was limited to a diffuse network of bush paths. The landscape was dominated by small-scale units of organisation, the great bulk of the population being engaged in the traditional sectors of agriculture, fishing, hunting and craft industries. European contact was limited to the coastal strip, where gold-dust, ivory and hides were bartered in exchange for simple metal tools and ornaments. However, with annexation, the development potential of the Colony became gradually apparent as European contacts were forged inland.

The last two decades of the nineteenth century and the first decade of the twentieth century were significant in terms of the structural changes in the economy brought about with the introduction of new forms of economic activity (Szereszewski, R., 1965). The simultaneous development of commercial gold mining and the introduction of cocoa spear-headed the transformation of the economy from a subsistence to a monetary basis. In geographic terms, the spread of cocoa farming from its initial foothold at Akwapim, north-east of Accra, westward and northward to Akim, Ashanti and Brong-Ahafo created a diffuse pattern of development over a wide area in the south of the country, while the spread of gold mining created 'islands of

development' in an otherwise subsistence environment. The growth of the cocoa industry was more significant in affecting directly the indigenous pattern of economic activity, since the mines merely superimposed a set of foreign enclaves on the landscape. Nevertheless, together these introduced activities established certain spatial patterns of development, the essential features of which are unchanged in contemporary Ghana. It was the forest belt of the south and west which felt the impact of these new activities, and the previously undeveloped resources of the forest took on a new significance with the application of modern technology and capital. Regionally, the south-west remains the main source of Ghana's principal export commodities, although a new regional balance is emerging with the development of the Volta River Project in the mid-1960s. The south-east is destined to become the main focus of secondary economic activity, based on the industrial complex of Accra-Tema, while the south-west will continue to lead in the production of primary products, a lead which was established in the late nineteenth century.

The introduction of modern mining methods and capital had the effect of allowing a large-scale increase in the production of gold. In addition, the advent of commercial mining meant that native labourers entered wage-earning employment for the first time, were introduced to the concept of industrial employment and given the opportunity to learn new skills. While the cocoa industry offered seasonal employment for unskilled labourers, the gold mines offered opportunities for a wide variety of skilled and unskilled jobs all the year round. Manufacturing industry was not established in the country until 1904, but it was slow to develop and not until after the second world war did it provide significant revenue or employment.

It was the gold mining industry which provided the main focus for large-scale employment in the country. In the pioneering stage of its development, however, the gold mining industry struggled to gain a firm foothold, and the geographical expansion of the industry was limited by the constraints of the 'subsistence' environment, particularly the absence of a modern infrastructure.

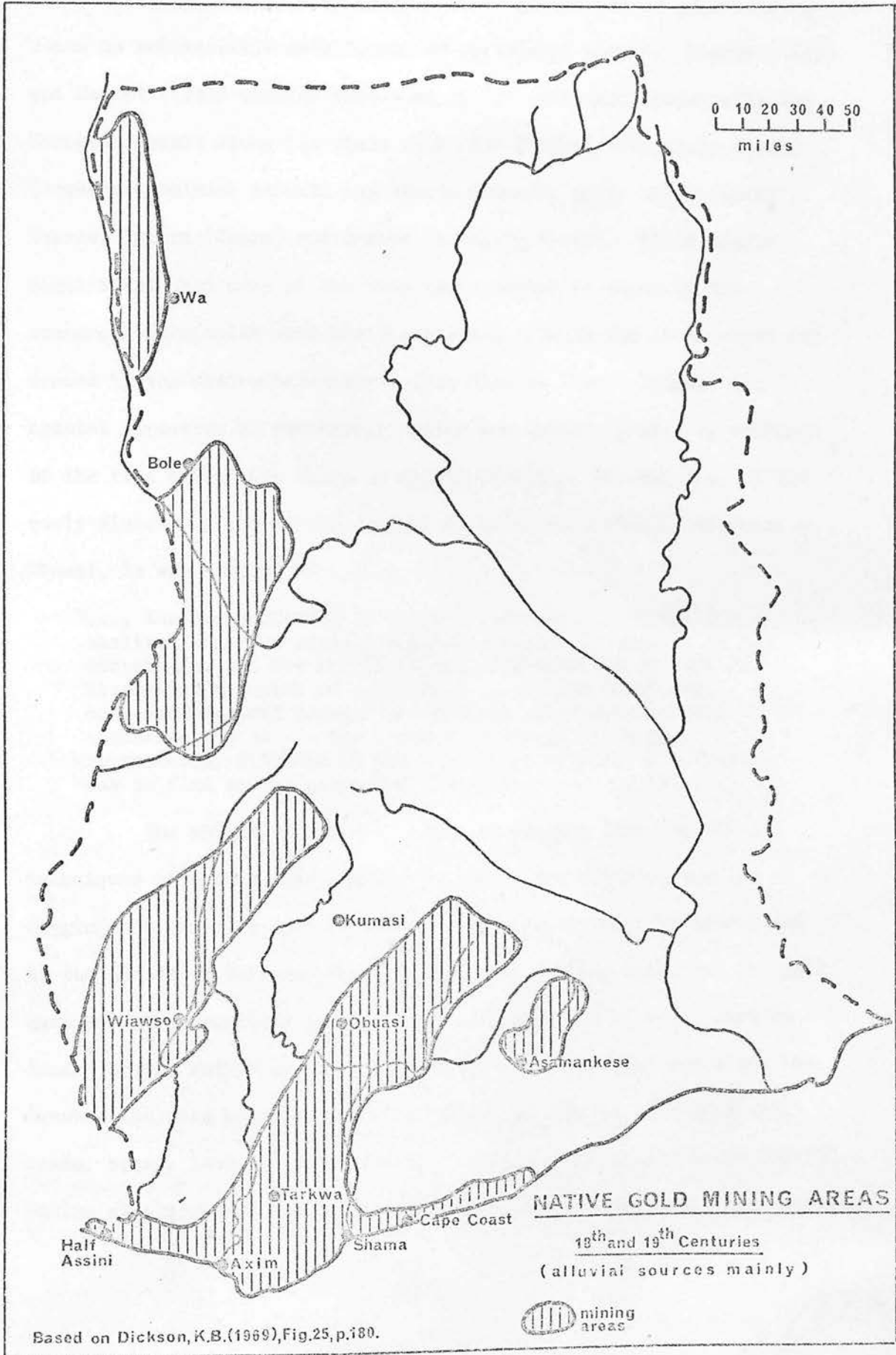
GOLD MINING IN THE PRE-COMMERCIAL PHASE

While the main theme of this chapter is the intrusion of modern mining into Ghana, a brief comment on gold mining in the pre-commercial phase will serve to place the modern developments into the wider historical perspective.

It is not known when gold mining began in Ghana, although most writers agree that the local inhabitants had been winning gold long before the first European contact with the West African coast in the fifteenth century. Previously, gold had been one of the main items of northward-oriented trade when the forest and savannah zones were more intimately linked than today by the southern extension of the long-established trans-Saharan trade routes (Hodder and Harris, 1967, p.225). Prior to the eighteenth century, most of the gold was won from alluvial sources, from stream and beach gravels, by simple panning methods. Later, auriferous reefs were also worked where they outcropped on the surface. The natives dug pits to find the extension of the reefs and recovered the gold by crushing the rock with crude implements (Meredith, 1912).

Geographically, native mining was widespread (Map 3.1), although the northern limit of native lode-mining was in the region of Kumasi (Junner, 1934, p.12). Indeed, it seems that the entire

MAP 3·1



Based on Dickson, K.B. (1969), Fig. 25, p. 180.

south-west of the country had been prospected and worked by natives, whose workings outline very clearly the distribution of gold-bearing rocks as subsequently established by geological survey. Bosman (1689) and Barbot (1732) confirm that most of the gold dust traded with the European powers along the coast came from Dinkira (Denkera), Acanny (somewhere between Ashanti and Akim), Ashanti, Akim, Awine (Aowin), Wassaw, Igwira (Gwira) and Quakoe (possibly Kwahu). It is highly significant that none of the main reefs worked in depth by the commercial companies were new discoveries outwith the areas known and worked by the native inhabitants from time to time. Indeed, the spatial expansion of commercial mining was largely guided by evidence of the reef alignments shown by native pitting. For example, of the early history of the development of Ashanti Goldfields Corporation at Obuasi, it was stated,

" ... the ore indicated by outcrop workings ... formed the earliest and most rapidly available source of revenue to the corporation ... the native in his primitive way of work had discovered a number of ore-bodies ... it was found what consummately good prospectors the old natives had proved themselves to be ... the various scattered workings represented, with one or two notable exceptions, all there was to find on the property" (Feldtman, 1916, pp.257-261).

The ability of native mining to advance from the simple techniques of washing and panning for gold from alluvial sources to digging and crushing rock from sub-surface sources may be attributed to the advent of European tools, which were readily exchanged for gold dust and other products of the coast. Indeed, the articles most in demand by the native in the simple barter-trade carried out along the beaches included heavy hammers and wedges of iron as well as cloth, beads, brass, lead and pewter basins (Oliver and Fage, 1962, pp.109-10). Native miners showed the ability to adapt to new techniques of production.



For example, the use of dynamite and other facets of introduced European technology was observed by travellers in the late nineteenth century (McCarthy, 1882). However, it was essentially the primitive technology which prevented the native gold mining industry attaining a high level of annual production. The native miner was able to sink circular pits but the ultimate depth of the pits was restricted by the water-table, for he had no means of combating the inflow of more than small quantities of water. The deepest pits, up to 150 feet deep, were located on hillsides where the natural water-table is far below the surface. Equally, the native did not know how to support his workings, and it was common to find as many as 100 pits per acre, none of them connected underground. Adits were driven into the hillsides only where the country rock was self-supporting. Treatment of the ore was limited to washing the gold from the containing material, so that gold locked up in sulphides or other refractory minerals was not worked by the natives.

The crude methods of winning gold were a major constraint on output in the pre-commercial phase, and earnings were low. Earnings from the alluvial sand and beach gravels were estimated to be about 10d per day per head, while the reef workings at Tarkwa provided an average daily income of between 1s and 2s per head (Skertchley, 1878). The wide scatter of native workings was by no means a criterion of the richness of the deposits of gold since some of the deposits were worked by forced labour, and,

"... even voluntary labourers were content to work very poor ground when there was a chance of finding patches of rich gold-bearing ground" (Junner, 1935, p.12).

Estimates of the total gold production of the country, prior to the intrusion of modern mining in 1877, vary from wildly exaggerated to

very conservative figures. One writer estimated that between £6,000,000 and £7,000,000 worth of gold had been exported from the coast in the centuries before 1800 (Macdonald, 1898). But these figures seem questionable in the light of another estimate for the entire world production of gold between 1400 and 1800 of under £7,000,000 in value (Ridgeway, 1929). From all available evidence, N.R. Junner estimated that some 14,500,000 ounces of gold dust must have been exported from the coast between 1471 and 1880 (Junner, 1934, p.14). The amount of gold kept in private hoards for ornamental purposes would add at least a further million ounces to Junner's figure. By contrast, in the subsequent commercial phase, over 32,000,000 ounces of gold have been produced (Appendix I).

THE INTRUSION OF MODERN MINING

Native methods of winning gold were superceded in the last quarter of the nineteenth century by capital-intensive methods introduced by Europeans. The entire spatial structure of the industry was changed from a pattern of scattered working sites based on labour-intensive production techniques to a relatively small number of modern mining centres based on capital-intensive production methods. The growth and development of the industry was thereafter controlled by outside interests.

Despite the widespread distribution of native workings, commercial mining was initially confined to the Tarkwa region, a mere 40 miles inland from the coast. The Tarkwa goldfield was the spring-board from which the later expansion further inland developed. Indeed, the banket ores of the Tarkwa area remained of prime economic importance for some 30 years despite the fact that the banket ores are of lower

grade than the auriferous reefs located further inland. The undue concentration of European interest in this area for so long was due to two main factors. First, the lack of adequate transport and the unsettled political conditions in Ashanti, until its final pacification in 1900, prevented the movement of men and goods into the interior. Secondly, the fact that the banket ore was recognised to be very similar geologically to the conglomerate deposits of the Witswatersrand goldfield in South Africa meant that capitalists were more willing to invest in the Tarkwa goldfield than elsewhere, regardless of the results obtained from the assay of the richer quartz ores. Indeed, as late as 1911, it was stated that,

"The investing public of London have learned to attach great weight to the word 'banket'. There is a prevailing idea that it is synonymous with the word 'dividend' ... Naturally promoters find it easier to secure money for banket deposits than for quartz" (Sharpless, 1911, pp.119-120).

The first concessions were taken by a Frenchman, Marie Pierre Bonnat, who is recognised as the 'father of modern mining' in Ghana. Bonnat was not in any sense a mining engineer. He was, in fact, a trader and explorer. He had been a prisoner of the Ashantis, and on his release in 1874 returned to France, and formed a company in 1877 to investigate the gold deposits in the Wassaw district of which he had learned during his imprisonment in Kumasi. In the same year, Bonnat obtained concessions along the Ankobra river near its junction with the Bonsa river, but he left those original concessions unworked in preference for other concessions in the Tarkwa area which he obtained in 1878-79. His company, 'La Compagnie Miniere de la Cote d'Or d'Afrique', was therefore the first European company to work the gold deposits in Ghana.

Bonnat's choice of area was guided simply by the intensity of native pitting along the east limb of the syncline of the Tarkwa goldfield. The main focus of native workings at that time was the 'Intaya Mine' (the later site of the Tarquah shaft), and Bonnat therefore obtained three concessions to the north, south and west of Intaya, at Abosso, Taquah and Tamsoo respectively; soon after he absorbed the native enclave also. Bonnat was guided more by instinct than sound geological knowledge in developing his concessions, as was evident by the way he approached the problem of mining. Much time, effort and capital were wasted in the first few years by driving tunnels into the hillsides in search of the 'golden core' which Bonnat believed the natives could not reach owing to the limitations of their primitive mining methods.

Nevertheless, despite Bonnat's ignorance of the true nature and structure of the banket, his enthusiasm stimulated a general interest in the gold deposits of the Gold Coast, and other companies were formed. In fact, there was a rush to take up concessions, and by 1881 they were being granted indiscriminately all over the Tarkwa region. Soon after Bonnat's company was floated, a Dr A.Horton acquired concessions at Abbontiakoon, Tamsoo and Dixcove, and he later formed the Gold Coast Company to work these properties. The Effuenta Gold Mining Company was floated on behalf of James Irvine from Liverpool about 1880, and about the same time, a Mr Crocker of Messrs F. & A. Swanzy and Company, a trading firm, took up concessions at Adjah Bippo, Cinnamon Bippo and Crockerville for the Wassaw Gold Mining Company. These were the four pioneer companies in the field of gold mining in Ghana (McCarthy, 1909).

The location of the original mines is shown on Map 3.2, and Table 3.1 gives details of the Europeans working in the Tarkwa district. The first mines to be worked were as follows: Abosso 1879, Crockerville 1879, Effuenta 1880, Taquah 1881, Adjah Bippo 1882, Abbontiakoon 1882, and Teberibi also 1882 (Halse, 1890-91). Although the four pioneer companies were producing by 1883, they did not prosper despite the richness of some of the ores, and a mere 7,000 ounces of gold had been produced by the end of 1884 (Junner, 1935, p.8). Indeed,

"... by 1885 the general impression is one of stagnation and loss of confidence in the industry" (Bevin, 1956, p.75).

The original companies struggled to survive, and none had declared a dividend from mining profits. Some of the companies failed and several mines were closed down only a few years after opening. According to E.Halse, who visited the Tarkwa goldfield in 1889, only the Taquah, Abosso and Teberibi mines were then still in active production, and mining was carried on at very shallow depths. A good example of one of the early failures is found in Halse's description of the abandoned Abbontiakoon mine,

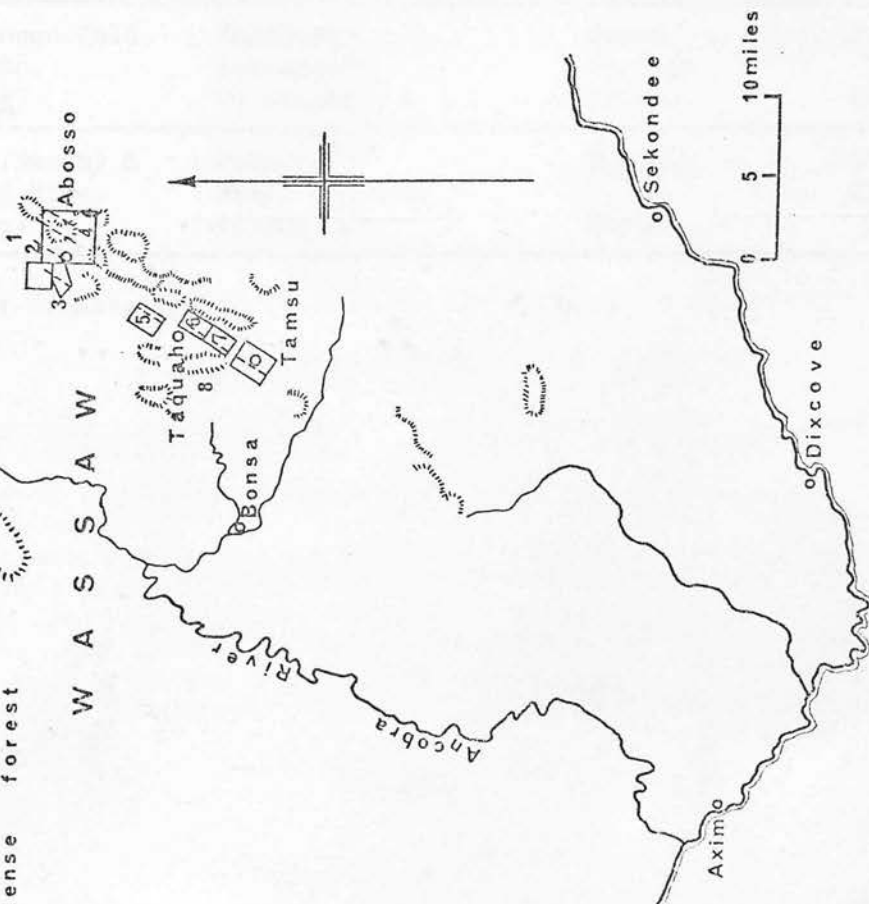
"A pile of old machinery on one side of the path, and the remains of a stonebreaker and a portion of the stamps shed on the other, all overgrown with tropical vegetation are sad relics of unsuccessful mining on the Gold Coast (op.cit., p.75).

CONSTRAINTS ON SPATIAL EXPANSION

The lack of progress in the industry can be attributed to many factors, the most important of which were the lack of transport facilities and the need for legislation to regulate the granting of land for mining. Of lesser importance in affecting the progress of gold mining in these early years was the problem of obtaining labour to work for the companies, but, since this matter assumed more

Unexplored
dense forest

W A S S A W

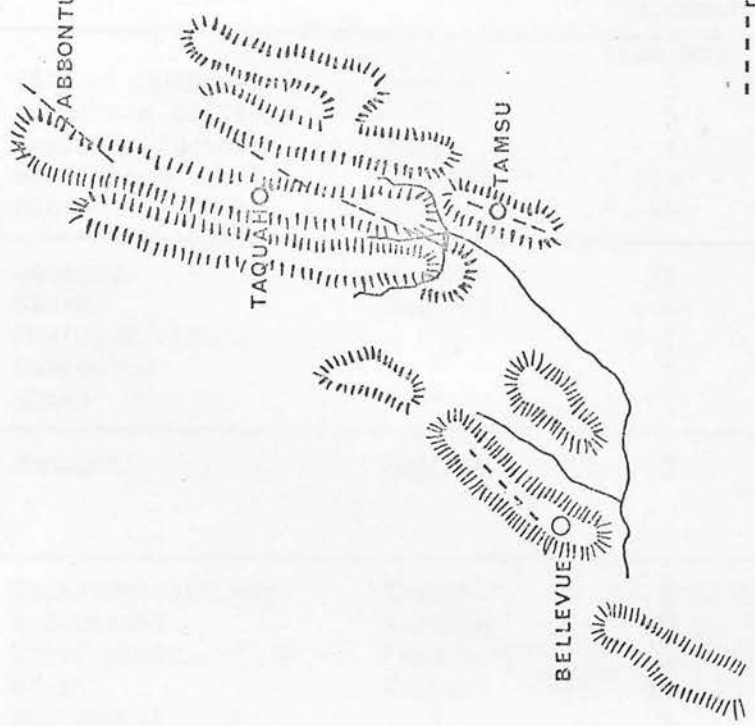


- 1 Cinnamon Bippoh
- 2 Adjah Bippoh
- 3 Abosso
- 4 Crocker ville
- 5 Abbontuyakoon
- 6 Taquah
- 7 Effuenta
- 8 Teberibi

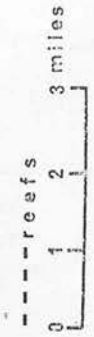
Forest



ABBONTUYAKOON



Forest



TARKWA GOLDFIELD: location of original mines

(after Halse 1890)

TABLE 3.1

EUROPEANS EMPLOYED IN GOLD MINING, 1882

Name of Mine	Persons Employed	Nationality	Length of Residence (months)
Gold Coast Gold Mining Co. (<u>Abbontiakoon</u>)	Mining engineer	Scotch	5
	Reduction officer	"	5
	Engineer/fitter	Welsh	1
	Head miner	English	22
	Miner	Welsh	12
Effuenta Gold Mines Co. (<u>Tarquah</u>)	Manager	Scotch	24
	Clerk	English	-
	Engineer/fitter	"	1
	Carpenter	"	1
	Miner	"	1
Tarquah Gold Mining Co. (<u>Tamsoo</u>)	Manager	English	2
African Gold Coast Co. (<u>Taguah</u>)	Transport officer	French	8
	Accountant	English	30
	Chief miner	French	3
	Miner	English	15
	Blacksmith	"	5
	Carpenter	"	12
	Reduction officer	French	12
The Abosso Gold Mines Co. (<u>Abosso</u>)	Engineer	Swiss	12
	Accountant	English	3
	Carpenter	French	12
Messrs. Swanzy & Co. Gold Mines (<u>Abosso</u>)	Proprietor	English	28
	Civil engineer	"	28
	Accountant	Scotch	9

Source: Holmes, 1926.

importance in the thirty years after the turn of the century than before 1900, the problem of labour supply is discussed in Chapter 4.

1. The Need for Transport

The difficulty of transporting machinery, incidental to a forest-clad country, in the absence of roads, bridges, railways, wheeled transport of any kind or even pack animals, was undoubtedly the major constraint on the rapid spatial expansion and the structural development of the gold mining industry. Although Tarkwa is a mere 40 miles inland from the coast, access was then limited to a diffuse network of bush tracks. The easiest, and at that time, the most direct route to Tarkwa was from the surf port of Axim, via the Ancobra river to its confluence with the Bonsa, and thence by the village of Appankrom a further 20 miles along a bush-path to Tarkwa (Wyatt, 1879, p.3). During the dry season the Ancobra and Bonsa rivers were barely navigable, except by light canoes, owing to the occurrence of rapids and to the masses of fallen timber that encumbered the channel. In such times, it was necessary to headload all the cargo, using local labour as carriers, via the same route, a journey that took several days through dense tropical forest and swamp. This system was both inefficient and costly. Many pieces of vital machinery never reached the mines since they were either damaged on landing through the heavy surf which beats along the coast, or abandoned by the carriers en route. A particularly graphic description of these problems is contained in this extract from the narrative, 'We Two in West Africa',

"It takes those forty men (i.e. carriers) four days, at least, under the most favourable conditions, to traverse the forty miles to Tarkwa. Swollen streams and wet, slippery foothold after rain, steep hill-sides, swamps, and fallen trees may delay them another three or four days. Again they may get tired of the job and, dumping their burden down in the bush,

depart to find new and more congenial work. That piece of machinery is probably not missed for a month or two, until the whole consignment has arrived at the mine and is checked, or until the niche into which it fits in the general order of things is reached. Then there is a hullabaloo, abusive letters to the London office, indignant replies, and finally a hue and cry which eventually unearths the absentee, reposing peacefully in the shade of an odum tree and almost, if not entirely, covered by a tangled mass of creepers and undergrowth" (Moore and Guggisberg, 1909, p.119).

Since all machinery had to be headloaded to the mines, it had to be sectionalised into manageable loads in the first instance. This, added to the environmental obstacles to transporting machinery inland, meant that the cost of such transport was inevitably very high, and was in part responsible for the poor returns on investment of the early companies and indeed the failure of many. The profits of mining were totally absorbed in transport costs. For example, in a report on the Wassaw District by Mr N.L.Peregrine, the District Commissioner, dated 1 April, 1897, details are outlined of the transport costs,

"Now the transport of the imports for the Tarkwa/Abosso Gold Mining Co., from Axim to Tarkwa for the last year weighed no less than 341 tons, which did not, so I understand, include the heavy machinery; the cost of landing the same at Axim amounted to £153, forwarding it up the river to Bonsah came to £2615, and the charge of carriage from Bonsah came to £2000, therefore the transport alone from steamer to the mines of 341 tons of goods amounted to £3968" (CO 879/49/No.531:18404/186).

From all available evidence it seems that up to some £50 per ton was the typical cost of getting equipment to Tarkwa from the coast. Labour costs were high: a letter-carrier, for example, received 13s 6d a day, plus a subsistence allowance of another 3d daily, from Axim to Tarkwa, while the short two-hour walk from Tarkwa to Abosso cost the companies 5s per carrier (Whitelaw, 1929, p.6).

Not only were transport costs high, but progress was slow which, of course, added further to the cost of getting the equipment to the mines. The rate of progress was limited to under 12 miles a

day and, although the river section could be passed in as little as 10 hours, under optimum conditions, it was more common for the river journey to take over two days (Skertchley, 1878, pp.274-283). The last section, 20 miles of bush-path, could also occupy over two weeks. For example, Mr H.Higgins, Civil Commissioner, writing in 1882, reported that,

"Mr Gowan, Manager of the above Mine (Abbontiakoon), has brought two trucks, laden with machinery, in all weighing one and a half tons from Bonsah to Abontynakoom. This is the first time that such a thing has ever been attempted in these parts, no one here believing it possible to drag trucks along such roads. It has taken him a fortnight to accomplish the journey, about 17 miles, and he has fifty-seven men engaged in the work" (Affairs of the Gold Coast 1882, Fourth Monthly Report, p.6).

Nevertheless, despite the high costs of mining in the pioneering days, a virtual gold rush developed in the 1880s, a gold rush which was premature in the extreme in the light of the transport bottleneck, and also because no legislation governing the granting of land for industrial purposes was in existence.

2. The Need for Legislation

Hundreds of concessions had been taken up throughout the Tarkwa region following Bonnat's example in the late 1870s, and the Civil Commissioner warned as early as 1882 that,

"This indiscriminate granting of Concessions will lead to serious complications in the future unless rules and regulations are established for the guidance of the European and native labourers" (Higgins, op.cit., p.3).

The news of the discovery of this new goldfield had been quickly and widely disseminated, and the granting of concessions for mining turned into a 'business' in its own right, which threatened to stifle the industry before it had barely begun (Leigh, 1904). The lack of legislation regulating these transactions led to a great deal of confusion

with respect to title of land, and this hindered the rapid spatial and structural development of gold mining in the pioneering period.

Once the commercial value of the Colony's gold resources became known, the forest belt was overrun by prospectors, and Europeans began to acquire land for mining, the exploitation of timber and other purposes in an unprecedented wave of speculation in the last quarter of the nineteenth century. Grants of land were made in the language of English conveyancing, itself not understood by the local inhabitants, and purported to convey the 'fee simple' or grant conditions of leases which essentially conflicted with the inherent land tenure rights of the natives. The native land tenure system was based on communal principles, the land belonging to the local 'stool', tribe, or more rarely the individual. These facts were not appreciated by the new British administration until later, but meanwhile hundreds of square miles of land had been alienated by the local Chiefs to Europeans for small fees, and, in most instances, neither party was clear what was involved in the transaction. Indeed, there had grown up an extensive commerce, in quite worthless concessions, between the natives, who were quick to realise the profits that could accrue from such transactions, and unprincipled European speculators, who traded the leases for profit to unsuspecting buyers. The need for legislation was urgently required on three main counts: to protect native rights to land and prevent landowners being fraudulently treated; to prevent capitalists gaining any sort of monopolistic control over large tracts of land; and to regulate the rights of competing concessionaires by establishing priority over them inter se.

The first attempt to introduce some measure of control was made in 1883 when the local legislature empowered the Chiefs to make

bye-laws with respect to mining, under the Gold Coast Native Jurisdiction Ordinance of 1883 (Stone, 1920). However, there were immense difficulties in introducing any formal legislation which would be effective, not only in regulating the concession 'industry' but also in encouraging the gold mining industry. The country had not been surveyed, no topographic base maps existed, and the natives themselves knew only the approximate boundaries of their lands as far as topographic and other features could mark them. The natives were ignorant of the amount of land they leased, had no idea what extent of country was contained in a given number of square miles, nor did they profess to know the meaning of fathoms. As a result,

"They always imagine that what they are granting is a mere fraction of the area which they actually dispose of" (Belfield, 1912, p.9).

The direct result of this was the recurrent problem that overlapping areas, or indeed the same areas, were granted to competing concessionaires. For example, in a letter, dated August 9, 1899, from Consolidated Mines Selection Co. Ltd., to the Colonial Office, the company complained that,

"The way of these native chiefs is to make a fresh agreement every day of the week with anyone who comes along and gives them a 'dash'" (African No.578, 21203/59).

Under these circumstances, the prevention of the improvident alienation of land was virtually impossible, and the embryonic gold mining industry was severely handicapped as a result. Litigation was frequent and much capital was wastefully absorbed in the pioneering years as one lawsuit after another was filed over competing claims to the same blocks of land: one typical example can be consulted in Appendix IV. As the paper transactions multiplied and the general confusion over concessions mounted, the investing public reacted with

increasing distrust of gold mining prospects in the Gold Coast. Capital became scarce at the very time when the companies required substantial capital for the proper prospecting and development work in the preliminary stages of establishing the mines.

It was thus into this state of general confusion that the Concessions Ordinance, No.14 of 1900 was introduced. This ordinance represented the resolution of legal and other difficulties which had prevented bills proposed earlier passing into law. Two bills proposed before 1900 were aborted because they failed to recognise fully, inter alia, the inherent rights of the local inhabitants with respect to land tenure. These were the Crown Lands Bill of 1894, and the Lands Bill of 1897, about which some comment is appropriate inasmuch as they bear on the progress of the gold mining industry.

The first, the Crown Lands Bill of 1894, was more precisely entitled "An Ordinance to vest waste-land, forest land, and minerals in the Queen". As the title suggests, it attempted to give the colonial power full administrative control over land in the Colony. This not only contradicted native customary law, but also would have had a serious effect on economic development since it would have prevented the inflow of capital from overseas on which much of the development of the country's resources depended. That this was clearly realised in the Colony is shown in a letter, dated 8 July 1895, to the Secretary of State for the Colonies from the Attorney-General, who commented that,

"One chief hope for this Colony, is that the speculative capitalist will become interested, but I fear that this Ordinance, if passed, will frighten him off for half a century as he won't know what's coming next" (African No.513, Enclosure No.1 in 12117/19).

Governor Hodgson, who also expressed disapproval of the import of the Bill, stated that,

"The Bill appears to me to be in many respects incomplete, even in the embodiment of the principles involved, and in my opinion, it goes too far in the direction of confiscation and spoliation" (ibid, Enclosure No.2).

As a result of all the unfavourable reactions, the Crown Lands Bill of 1894 was shelved, but the problem still remained that the bona fide companies were failing to attract fresh capital largely because of the continuing malpractice in the concession industry. As a temporary measure, in an attempt to stop all trading in new concessions until new legislation could be drafted that would satisfy both the local inhabitants and the companies alike, Governor Maxwell filed a notice in the late part of 1895 prohibiting the conveyance of any land for industrial purposes (the full text of this notice can be consulted in Appendix V).

Early in 1896, Maxwell prepared a new draft bill, known as the Lands Bill of 1897. This bill dealt with basically the same matter as the abortive Crown Lands Bill, except that it was recognised by that stage that the Crown had no tenurial rights over the land. This second bill met with similar opposition, both from the newly formed Gold Coast Aborigines Protection Society and from the mining industry. The gold mining companies objected particularly to the clause which required the payment of a 5% royalty on the gross value of gold won. It should be recalled that mining costs were still very high at this period due in the main to the high transport costs in the absence of modern facilities. In this light it is easy to understand the objections of the mining companies to the royalty clause. The following extracts from contemporary correspondence summarise the main objections to the 1897 Bill. In a letter dated May 3, 1897, from the Wassaw (Gold Coast) Mining Co., to the Colonial Office, it was stated that,

" ... if such an ordinance were passed, it would most surely cripple the existing companies, and discourage the further investment of capital in the mining districts of the Gold Coast ... The total gross returns of this Company (which was typical of the whole industry) up to the end of last year amounted to 131,453 l, against an outlay of 163,243 l, and no dividends have yet been paid" (African No.531, 9394/97);

James Irvine, of the Effuenta Co., echoed similar alarm in a letter of May 3, 1897, stating that,

"I can only look upon this as absolutely prohibitive of any further enterprise in the Colony" (African No.531, 9471/98);

and finally, F. Swanzy, owner of several concessions in the north of the Tarkwa goldfield, pointed out in a letter to the Colonial Office dated May 5, 1897, that,

"We know of no goldfields in the world which are being worked successfully, where 5 per cent on the gross output is charged, it being generally realised that such a charge would be ruinous to ordinary quartz mining and very excessive on even rich mines" (African No.531, 9555/100).

For these, and other reasons, the Lands Bill, like the Crown Lands Bill, was abandoned, and it was a further three years before the Concessions Ordinance No.14 of 1900 was passed.

The Concessions Ordinance was made retrospective to 1895, the year in which Maxwell had filed the notice stopping all land transactions pending the enactment of such legislation. This ordinance, however, was only applicable to the area of the Colony, and as the attention of the capitalists had begun to turn further inland to Ashanti by this time, it became necessary that the Supreme Court should also exercise jurisdiction in Ashanti to prevent the same improvident alienation of land there as had occurred in the Tarkwa mining district in the years before legislation existed. The formation of Ashanti Goldfields Corporation, Ltd, in 1897 and the promising results it obtained had drawn the attention of Europeans to the possibilities of

profitable investments in Ashanti. Ashanti Concessions Ordinance No.3 of 1903 was therefore speedily prepared and passed into law.

Needless to say, the Concessions Ordinance did not immediately solve the problems at which it was directed. All the mining concessions needed to be overhauled in light of the new regulations; for example, Clause 20 imposed a 5 square mile limit on the size of concessions. Some of the older grants of leases could not be traced, particularly those granted before 1893, when the registered lists were first published in the government Gazette. The need for survey was the primary requirement to expedite the work of the Concessions Court (set up under the Ordinance), as was pointed out by the Fanti Corporation Ltd., in a letter of March 7, 1901,

"... the efficiency of the Concessions Court will be decreased without the general guidance of a reliable map of the Gold Coast. All existing maps, as is well known, have been compiled from the independent observations of various travellers and others, and large areas of the country remain unmapped, consequently the Concessions Court may not be able to avoid the granting of concessions which will be found to overlap when the boundaries are defined on the ground" (African No.652, 8611/37).

It was proposed that the cost of carrying out official surveys of the mining companies' concessions should be charged to the concessionaires at the rate of £20 per square mile. To this end, a party of surveyors was sent out to the country in 1901. A particularly vivid account of the work of marking the boundaries of the mining properties can be consulted in Appendix VI.

The efficient working of the newly constituted Concessions Court was unfortunately hindered further by the somewhat untimely occurrence of a second boom in the gold mining industry in 1900-01. This second wave of speculation (the reasons for which are discussed in Chapter 4) was accompanied by a similar but even larger wave of

concession-hunting to the detriment of any real progress in the industry. In an attempt to curb the worst features of the trade in worthless documents which had bedevilled the previous boom in the 1880s, the Secretary of State for the Colonies inserted a general warning to the investing public in 'The Times' of 23 February 1901, through his private secretary, which read,

" ... the fact that the prospects of the gold industry in a large country are promising from the point of view of the ability of the Colony to bear its own burdens, should be no inducement to the investor to subscribe to a particular enterprise without the most careful investigation ... the present speculation in West Africa appears to him (the Secretary of State for the Colonies) to be premature, and that the solid prosperity of the Colony is likely to be endangered by the disappointment which will be caused by injudicious investment."

However, gold has a unique fascination to man, and, in spite of this warning, the concession industry continued to flourish. The legal ratification of deeds were therefore long delayed in the Concessions Court, and the mining companies could not develop their properties at a satisfactory rate. These delays contributed in a significant way to the lack of progress experienced by the gold mining industry in its pioneering stage.

CONCLUSION

It is apparent from all the available evidence that two main constraints on the rapid spatial and structural development of the industry in its pioneering years can be identified. First, the lack of efficient transport not only caused long delays in the work of setting up the machinery at the mining sites but also meant that the pioneer companies bore abnormally high costs owing to the high cost of transport. Secondly, the time and money wasted by the companies in attempting to establish their claims to concessions in the absence of legislation

regulating such transactions, further delayed progress in developing the industry. In terms of the relative weight of these two factors, the need for transport was undoubtedly the primary cause of the limited progress made by the early companies, while the lack of legislation assumed a secondary role in hindering the rapid spatial and structural expansion of gold mining in the pioneering stage of its development. Other minor factors which contributed to the slow progress included the unsuitability of the climate for Europeans, resulting in high staff turnover, the generally unhealthy and unsanitary conditions which obtained, and the inefficiency of the equipment then in use. In addition, the pioneers had a very limited knowledge of the geological characteristics of the gold-bearing ores and extraction and reduction methods were inevitably in an experimental stage.

During the first 20 years, therefore, production of gold was intermittent, insignificant and more or less on a trial basis. Mining operations were confined to surface work or mining at very shallow depths. The general impression is one of stagnation rather than progress with the pioneer companies struggling to hold out in very difficult conditions. Geographically, the Tarkwa goldfield, located some 40 miles inland from the coast, remained the main focus of commercial gold mining until 1897 when the Ashanti Goldfields Corporation was formed and took out mining concessions some 120 miles inland in Ashanti.

Nevertheless, in spite of the many difficulties which faced the companies in the early period, it was recognised that the Gold Coast was a potentially profitable area for gold mining operations, and by the first decade of the twentieth century all the goldfields had been opened up by European companies. In Chapter 4, the spatial expansion of the industry is described, the stimuli to its geographic spread are isolated and the subsequent constraints on its progress are examined.

CHAPTER 4

THE HISTORICAL PERSPECTIVE:1902-1930 : THE CONSOLIDATION OF GOLD MININGINTRODUCTION

Despite the intrusion of modern mining in 1877, and the premature 'boom' of the early 1880s, it was not until the turn of the twentieth century that the industry spread inland from its initial focus on the Tarkwa goldfield. This expansion was accompanied, and indeed partly induced, by a second but much more significant 'gold rush' over the period 1897-1901, reaching a peak in 1900-1901. According to the West African Yearbook for 1901, a total of 402 companies had been formed to acquire gold mining rights in the country by that date. Nearly £40,000,000 had been subscribed by the public, and it was estimated that more concessions had been granted to different competing companies than the total area of the Colony covered! As with the earlier boom, many of the companies failed, and most of the money invested by the public was lost very quickly. The causes of failure were largely those that had led to the collapse of the boom 20 years earlier, namely,

" ... difficulty and high cost of transport of mining material, too much optimism, inefficient or careless prospecting and fraudulent reports" (Kitson, 1932, p.4).

Nevertheless, despite the bad features of the boom, this second wave of speculation produced some good features to the benefit of the industry; in particular, all the main goldfields were opened up by bona fide companies, and by 1910 the full areal extent of the gold mining industry had been established. Geographically, gold mining crystallised around five main core areas, namely, Tarkwa, Prestea,

Obuasi, Bibiani and Konongo. In addition, dredging for gold was established along the main south-flowing rivers, particularly along the Ancobra, Prah and Tano.

SPATIAL EXPANSION

From Tarkwa the second area to attract European attention was the Prestea goldfield, some 20 miles to the north-west of Tarkwa. The opening up of the Prestea district can be seen essentially as an offshoot development from the Tarkwa area. By 1889, two European-financed companies were operating at Prestea. The first, the Gie Appanto Gold Mining Company, Ltd., whose mine was about one mile from the Ancobra river, began work in November 1887, some ten years after Bonnat had taken up concessions in Tarkwa. The second, the Prestea Mine of the Essaman Gold Mining Company, which had been registered in 1885, was also operating by 1889 (Junner, 1935, p.21). Access to the Prestea district was then limited to the Ancobra river route. The opening up of the goldfields further inland was closely linked with the construction of the Government railway, which passes through the Tarkwa district and hence to Obuasi, which it reached by 1902. Ashanti Goldfields Corporation, formed in 1897, was the first company to take up concessions in Ashanti and it began production in 1898. The Bibiani goldfield, some 70 miles to the north-west of Obuasi, was first exploited on a commercial basis in 1900, and the Konongo area, some 20 miles east of Kumasi, was at least prospected, if not actively worked, by Europeans around 1902. The mines on the Tarkwa, Prestea and Obuasi goldfields prospered after the coming of the railway, but the Bibiani goldfield was never linked to an arm of the railway as the original companies had hoped it would when they began operations.

In addition, two small dredges commenced work in 1902 on the Offin river near Dunkwa (through which the Government railway also passes en route to Kumasi), and these were quickly followed by others on the Ancobra, Prah, Birim and Fura rivers. The peak of dredging activity was reached about 1909, when 15 dredges were in operation. But in these early days, dredging for gold was not as successful as deep-level mining, and most of the dredging companies failed owing to,

"... unsuitable dredges, difficulty with waterlogged and drifted timber, rocky bars across the rivers, theft of gold and amalgam from the dredges, incapable and careless management and supervision, want of forethought regarding rivers subsiding quickly after the rains, drifting and sinking of dredges during floods, ill-health, bad habits and bad luck" (Kitson, 1932, p.4).

With the spread of the industry inland and the discovery of all the main goldfields by the first decade of the twentieth century, an era of prosperity seemed at hand. Many of the original companies were reconstructed and benefited from the inflow of fresh capital which attended the boom of 1897-1901. But, the inevitable crash came as is usual when the market overruns its industry, and by 1902 the mining market was in a state of collapse. This had the effect of discouraging investors who were impatient of returns on their investments, and many lost confidence in gold mining in West Africa. This distrust of the industry continued throughout the first decade of the century even though some of the mines began to show profits, albeit small, and gold to the value of £100,000 was being exported each month by 1907. The principal reason for the distrust of the industry in the City was the inflated prices and subsequent collapse in prices of mining shares which had occurred during 1900/01. At the height of the boom, prices reached absurd levels, £1 shares of some mines rising as high as £30 to £40 (Moore and Guggisberg, 1909, p.116), and in the aftermath, as the market settled down, the depreciation of twelve of the more important

companies amounted to over £8.25 million in a matter of three weeks (Leigh, 1904). Most of the ventures were heavily over-capitalised, with companies floated on quite fraudulent assays and, in some instances, shares were even sold on behalf of mining properties which had never been visited by a European. A flood of prospectuses entered the Colonial Office but most would not have borne examination in the field.

Under these circumstances, the only means of restoring public confidence in gold mining in the Gold Coast was to show some return on the capital invested in the form of gold exports. To this end, mine managers were urged by their London-based directorates to initiate crushing operations even before all the necessary preparatory work had been completed. This was done on many properties, with the result that development work lagged behind and eventually several companies, which had mistakenly adopted this policy to appease their shareholders, went into premature liquidation. Apart from the mistakes made through mismanagement at the London headquarters, there were, of course, also examples of the squandering of development capital by incompetent mine managers. Moore and Guggisberg quote cases of mine managers drawing salaries of between £100 and £150 per month who never got further inland than Cape Coast or Sekondi. Nevertheless, as they pointed out,

"The mail would carry away progress reports of the work done on the mine, fictitious returns of the gold found, and sanguine anticipations of future prospects found thereon; urgent demands for another draft on the Bank of British West Africa, and occasionally, specimen lumps of rich quartz, probably procured locally" (op.cit., p.125).

Fortunately for the survival of the industry, a few bona fide companies carried on and the results of their efforts were sufficient to restore public confidence, and a revival of interest in gold mining in the Gold Coast began about 1909. At this time,

financial backing was secured from three of the most influential South African mining houses for the development of the Tarkwa goldfield, and thereafter the industry developed on a sounder basis. Structurally, the industry was rationalised through the amalgamation of the smaller properties and other companies were entirely reconstructed, emphasising, in their statements of policy,

"... the importance of dealing with the mines on an extensive scale in order that costs may be reduced considerably"
(Jackson and Morgan, 1909, p.15).

By 1910, therefore, the broad locational pattern of gold mining as it is found in modern Ghana was fully established. Geographically, the industry is still focused on the five centres of Tarkwa, Prestea, Obuasi, Bibiani and Konongo, where deep-level mining has been continuous since the turn of the century, and earlier in the case of the Tarkwa centre. The only significant locational change since 1910 has been the shift of gold-dredging from the Ancobra, Prah and Tano rivers, which were worked earlier, to the Offin and Jimi river valleys, where current dredging operations are located. The modern structure of the industry, however, bears little resemblance to that of the earlier period which was characterised by a large number of small-scale companies. Today, the industry is run by two large corporations, one in the private sector and the other publicly-owned.

As a corollary, it is important to ask what happened to the 402 companies which were floated in the period 1897-1901, and indeed what effect did they have on the geography of gold mining? On this question, an important distinction has to be made between 'concessions filed' and 'concessions which gained a Certificate of Validity'. According to the records, some 3,500 concessions were 'filed' by competing concessionaires at the turn of the century, but very few of

these concessions were given Certificates of Validity to allow mining operations to begin. In other words, very few of the mining concessions taken out have ever been worked, since most failed to be validated by the Concessions Court as required under the Concessions Ordinance No.14 of 1900. The large number of concessions 'filed' on behalf of the 402 companies floated at this period merely cluttered up the Land Registers with worthless paper transactions and had no effect on the geography of gold mining. The extent of land actually given over to mining was very small since most of the 3,500 concessions lay idle and were eventually abandoned. In this light, it is important to read the early 'maps', as Wallach's Mining Map of 1900, with extreme caution, since the vast number of concessions plotted on such maps gives a misleading impression of the extent of gold mining in the country. As stated, gold mining crystallised around five main centres of Tarkwa, Prestea, Obuasi, Bibiani and Konongo, whereas a cursory examination of the early maps tends to give the impression that the entire south-western part of the Colony and Ashanti were given over to gold-mining! This conclusion is borne out by other evidence, derived from the Annual Reports of the Mines Department, from which it is seen that the maximum number of companies actively producing gold in any one year was recorded in 1939-40 when 16 companies were responsible for the total output of the industry for that year, and that the maximum number of companies engaged in mining activity of some kind (although not necessarily at the producing stage) was recorded in the years 1935/36 and 1936/37, when 31 companies were carrying out work on their concessions. From these facts, it is evident that a very large number of the 402 companies registered in the boom period of 1897-1901 failed to gain Certificates of Validity to enable them to work on the

TABLE 4.1

LAND ALIENATED FOR INDUSTRIAL PURPOSES
IN THE GOLD COAST COLONY, 1901-1911

(square miles)					
Year	(i)	(ii)	(iii)	(iv)	(v)
1901	3.529	-	-	-	3.529
1902	8.991	6.142	-	-	15.133
1903	69.307	21.657	-	-	90.965
1904	110.652	20.957	-	-	131.609
1905	86.734	22.939	-	-	109.673
1906	15.695	10	15	-	40.695
1907	29.953	2.105	3.332	-	35.390
1908	20.639	1.489	36.913	-	59.041
1909	-	-	145.920	-	145.920
1910	22.717	21.283	1.366	-	45.366
1911	38.360	20.112	2.136	141.148	201.756
TOTALS	406.577	126.685	204.607	141.148	879.077

- (i) mining.
(ii) mining with other rights.
(iii) timber and other rights.
(iv) petroleum and other oil.
(v) total land alienated.

Source: Belfield, 1912 (Cmd.6278).

concessions leased at that time. The extent of land alienated for industrial purposes (i.e. land covered by Validated Concessions) in the Gold Coast Colony between 1901 and 1911 amounted, in fact, to less than 1/27th of the total area of the Colony (see Table 4.1), whereas the total area encompassed by concessions 'filed' has been estimated from the old records as some 3,000,000,000 square miles (Belfield, 1912, para.40)!

STIMULI TO SPATIAL EXPANSION

The 'gold rush' which occurred at the turn of the century leading to the opening up of the goldfields further inland can be attributed to many factors. Several events coincided at that period, of which four in particular seem to have been largely responsible for the renewed interest in the gold mining industry. These were favourable encouragement from government circles; substantial geological reports; the formation of successful mining ventures, particularly Ashanti Goldfields Corporation; and the construction of the railway.

1. Official Backing

Early in 1899, the attention of the capitalists in the City was called to the improved possibilities of gold mining in the Gold Coast in a speech by Joseph Chamberlain, then Secretary of State for the Colonies, made in the House of Commons on March 11, 1899,

"I am more confident than ever that these Colonies will turn out to be a most valuable possession, and acting on that belief, I am placing on the Colony a certain burden in the shape of a duty, with the fullest confidence that before very long they will be able to repay it. I base this, not on the commerce of spirits but a general increase in trade which is taking place, and which I anticipate will develop to an extraordinary degree as soon as we get Railway communication (this has already commenced) and also upon the prospects of the gold industry of the country. I confess that I do not wish to boom that

industry at this time but from all the information that I have obtained, it is going to be I believe a most solid, valuable and profitable industry in the Colony" (Parl. Debates, House of Commons, August, 1899).

Despite Chamberlain's cautionary note, his speech had the very effect of booming the industry, and corroborative statements made by local officials left the investing public in little doubt that they could profit from gold mining in the Gold Coast, even if some of the local reports were over-enthusiastic. For example, in the Annual Report of the Gold Coast for 1898, it was stated,

"In the Western Province of this Colony it is estimated that there are about 20 miles of banket formation, and if this land were treated in the same way as similar land in Johannesburg it is estimated that it would contain 13,000,000 tons of banket reef from which about £40,000,000 worth of gold could be extracted by ten years' operations ... yielding an annual profit of one and a quarter millions sterling."

The local government itself even displayed some interest in participating directly in gold mining. An attempt was made by public enterprise in the mining industry in 1897, when the then Governor, Maxwell, was authorised to spend £1000 on a scheme for alluvial gold mining, complete with imported Chinese miners and prospectors (Kimble, 1963, p.24)! Although this particular venture came to nothing, all evidence suggests that the Colonial Office and local officials regarded the gold mining industry as the primary point of the Gold Coast's industrial and economic potential. The more conservative reports of the period recognised that the Gold Coast would probably not become a leading world producer of gold, but that nevertheless, gold would attain a high local and external value in the economy.

2. Geological Reports

At the same time, several important studies were made by geologists of the gold deposits of the country. In particular the

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Tarkwa goldfield was investigated in some detail, and the gold-bearing ores were recognised to be similar in structure to the ores of the Witswatersrand goldfield in South Africa, which had proved its potential profitability by the turn of the century. The reports of Halse (1890/91) and Sawyer (1901) were widely circulated and evidently aroused public interest in gold mining in the Gold Coast. In March 1900, encouraged by the geological information and by Chamberlain's speech, a prospecting company, the Gold Coast Agency (a subsidiary of Consolidated Goldfields of South Africa Ltd.) was formed to prospect the Tarkwa area by means of boreholes. The banket formation was proved to be so consistent in character that capital for development was easily obtained from the investing public. Of particular significance in creating confidence in the minds of the investing public was a report by Mr Louis Webb, a mining engineer of some experience from the Rand, who reported having struck a banket reef at a depth of 773 feet, 43 inches in width and yielding some 22 dwts per ton (CO 96/424/1904: Memorandum on History of Mining on the Banket Reefs, unsigned). In addition, because of the Boer War in South Africa much capital was diverted to the West Coast; for the Tarkwa goldfield alone, over £2,000,000 of working capital for exploration was subscribed.

3. The Formation of Ashanti Goldfields Corporation

Although the geological reports favoured the development of the Tarkwa goldfield, the possibilities of profitable ventures based on the gold-bearing quartz ores, located further inland, were highlighted by other events. In particular, the opening up of the Obuasi goldfield by the Ashanti Goldfields Corporation, registered in 1897, and the publication of this company's outstanding assays stimulated widespread interest in the quartz ores. This company was formed on

the basis of assays of ore samples sent to England in 1895 by Edwin Cade, a merchant in the Gold Coast. The samples he forwarded to London assayed on the average at over 10.5 ounces per ton, and other specimens yielded up to 2757 ounces to the ton (Eaton Turner, 1947). Cade secured, in fact, the most lucrative bargain in the field of gold mining by obtaining a written agreement leasing no less than 100 square miles of land from the Chiefs of Adansi and Bekwai. The Government was at that time unable to sanction or disallow Cade's negotiations since they had taken place in Ashanti, over which the Administration had still then no jurisdiction. But, when the Ashanti company was registered in 1897, a fresh agreement was drawn up, under which the Government was to receive a 5% royalty on the gross profits and the local Chiefs were to receive annual rent payments amounting to £100 and £66 going respectively to the Chiefs of Adansi and Bekwai. This agreement was unique in that it was exempt from the operation of the Ashanti Concessions Ordinance of 1903. The terms of this agreement were not to be repeated, however; but its very existence, once known, encouraged other prospectors into the interior in search of gold-mining concessions. In this way, the formation of Ashanti Goldfields played a significant role in the spread of commercial gold mining from its initial focus around Tarkwa, and stimulated a general interest in the commercial possibilities of the gold-bearing quartz ores which had hitherto been largely ignored.

4. The Construction of the Railway

The construction of the first line of railway in the Gold Coast was by far the most important stimulus to the mining boom which occurred at the turn of the century. This line, a 3-foot 6-inch gauge, single-line track, was begun in 1898 and linked the Tarkwa goldfield

with the coast at Sekondi. The line was further extended from Tarkwa to Kumasi which it reached in September 1903. The costs of gold production were thereby substantially lowered and at the same time the existence of the railway encouraged the spread of modern mining into the interior. The building of the railway in effect resolved the main bottleneck to progress in the gold mining industry and indeed to the general economic development of the country. The alignment of the route was chosen with the development of the gold industry particularly in view, as was officially stated on many occasions. For example, in correspondence with the Manchester Chamber of Commerce in 1897, an official of the Colonial Office wrote, with respect to the Sekondi-Tarkwa section,

"I am to state that this Railway is being undertaken to serve the gold mines in the Tarquah district, the whole length being only about 40 miles" (African No.531:15039/325).

The extension to Kumasi was similarly designed to serve the Obuasi goldfield; it passes through the property of Ashanti Goldfields Corporation and was sanctioned in 1901 under a guarantee from that company that it would make up the annual net earnings of the railway to a sum agreed upon. Consequently, the simultaneous development of mining and the railways brought about a considerable inflow of capital and encouraged a general increase in imports which rose by some £1 million per annum between 1898 and 1902.

The decision to build the Sekondi-Kumasi railway, in fact, represented the resolution of a prolonged controversy between the commercial and mining communities in the Colony. Each community sent delegation after delegation to the Colonial Office with suggested schemes for lines of railway which would open up the interior and serve general developmental purposes. From the late 1870s, railway-building

projects were submitted to and rejected by the Colonial Office, and indeed a great deal of time, effort and capital were expended in testing and surveying alternative routes. Axim, Dixcove, Cape Coast, Shama, Appam and Accra were all put forward as suitable terminal ports for railways before Sekondi was eventually selected. A great number of the earlier schemes were proposed by private mining interests, as for example, when a mining company sent out a Mr Barham to Tarkwa in 1882,

"... to survey the Country with a view to ascertain the possibility of the construction of a line of railway from the coast to the mines" (Affairs of the Gold Coast, 1882, p.76).

Other surveys were appointed by the Colonial Office, on the recommendations of the commercial community, as for example, Captain Lang's expedition to the Gold Coast in 1892. In his report, he recommended that the first priority was a line of railway to serve the central region, from Appam to Kumasi, and a subsequent survey by F. Shelford in 1895 made a similar recommendation. However, it was obvious that neither the mining community nor the commercial community could be allowed to implement any of their proposals without thorough investigation by the authorities, and in order to prevent the undue division of the country by a series of unconnected lines reaching the interior from points along the coast, the Colonial Office decided that it would neither sanction the construction of railways by private companies nor accept the reports which had advocated the central line. The least satisfactory feature of the lines demanded by the mining companies was that they were wanted for the sole purpose of transporting heavy machinery to the mining sites, after which the mining industry would generate very little traffic.

With these considerations in mind, the decision was therefore delayed for some twenty years until such time as either the mines or the trading prospects of the Colony could be shown to be viable and long-term propositions. This hindered the progress of gold mining in its pioneering period, although it was made clear that the general policy likely to be adopted with respect to railways would be along the lines of the Earl of Derby's decision of July 1883, that,

"It would be impossible to give a guarantee to a private company from the Colony revenue but if satisfied that the railway would pay, the Colonial Government might itself construct and work it"
(African No.531: Enclosure in 16785/339).

But it was not until 1896 that the railway-building policy became clearer. In December of that year, the Governor recommended that a survey should be made to the Tarkwa district at least, and so, inspired by the Governor's request and by the ever-growing volume of correspondence from the mining companies, who pleaded their case for a railway with both sensible and emotionally-inspired facts and figures about the impending failure of gold mining in the absence of modern transport, the authorities in London were convinced of the need for such a railway to link the Tarkwa goldfield at least with the coast. Thus, early in 1897, a mining expert was sent out to the Gold Coast to obtain,

"... trustworthy information as to the mineral resources of the country, in order that it may be possible to judge whether it would be worth while to spend some £200,000 upon a railway"
(African No.531:2804/48; Colonial Office to Crown Agents, 26 February 1897).

Meanwhile, Shelford and Sons was instructed to carry out a survey from Sekondi, or other point along the coast, to Tarkwa.

Fortunately for the mining community, if unfortunately for the commercial community, Shelford's report submitted in 1897 was accepted, and, backed up by the opinion of the mining expert's

confidential report which underlined the long-term profitability of the gold mining industry given adequate transport, the Secretary of State for the Colonies ordered the Sekondi-Tarkwa line to be started in December 1897, stating that,

"The construction of railways must be for some time to come limited to works which promise to be immediately remunerative" (African No.531: Enclosure in 16785/339; Memorandum on Gold Coast Railways).

This long-awaited decision created an immediate upsurge of renewed interest in the industry. Orders for new equipment were speedily despatched to England and many mining properties which had lain dormant since the early 1880s were taken in hand and the preliminary work, as the clearing of trees, was begun in readiness for the installation of machinery when the railway line was completed to Tarkwa. Prices of mining shares rocketed, and companies proliferated once the news of the Sekondi-Tarkwa railway was made public. Similarly, in 1900, with the announcement of the extension of the line to Kumasi, interest in the industry heightened and provided an added stimulus to opening up the goldfields further inland. This revival of interest was, however, premature and long delays in the completion of the railway and therefore in the progress of gold mining was one of the causes of the disillusionment in the industry which immediately followed the mining boom. (A discussion of the problems of railway construction in the Gold Coast and the reasons for the slow rate of progress in completing the Sekondi-Kumasi line can be consulted in Command Paper 2325 of 1905.)

While the spatial expansion of gold mining can be attributed, inter alia, to the advent of the railway, its construction did not go without protest from the commercial community which even attempted to have the decision for its particular alignment reversed. For example, the Manchester Chamber of Commerce complained to the Colonial Office that,

"The Tarquah scheme is designed mainly if not exclusively in the interest of gold mining, and there is little likelihood that it can do much toward serving the general industrial and commercial interests of the Colony" (African No.531: 16785/329).

And again, doubly annoyed that their claims had been overruled in preference for the extension from Tarkwa to Kumasi, it was stated that,

"... it is not unreasonable for the commercial community to ask that the long-promised Central Railway should be immediately put in hand, even if so doing would mean a delay in the full extension of the Tarkwa line to Kumasi" (CO 96/370: Memorandum on Gold Coast Railways put before the Director of the Manchester Chamber of Commerce, May 9, 1900).

All the remonstrations were in vain, however, and perhaps for the important reason that financial support for railway building could not readily be met out of the Colony's revenue. It is quite evident that the Tarkwa-Kumasi extension would not have been sanctioned at that period had not the Ashanti Goldfields Corporation proposed to give financial backing to the line in the form of some £30,000 guaranteed revenue per annum. In these terms, the mining industry had a stronger case for a railway to serve their needs than did the commercial community. Gold mining thereafter became the key export sector of the economy, attaining an export value of over £1 million by 1907, which represented 50% of all exports by value, for that year. Improved communications also encouraged the export of other products, notably rubber, timber, palm oil products and kola nuts as well as cocoa. The pace of economic development was quite remarkable, due in no small measure to the capital investment in the mines consequent on the construction of the Government railway. This in turn stimulated the development of other resources of the forest zone, and in these terms the gold mining sector can be said to have propelled the economy from a subsistence to an export economy.

CONSTRAINTS ON PROGRESS

While the coming of the railway and other events at the turn of the century favoured the consolidation of gold mining in the Gold Coast and its steady expansion from about 1902/3, the industry did face other and new difficulties to its rapid growth and development. Indeed, many problems dating back to the earlier pioneering period remained unsolved, and new problems arose. From the available evidence, it is possible to isolate three difficulties which impeded the rapid spatial and structural development of gold mining: the continuing isolation of some of the goldfields from modern transport lines; the continuing high costs of production owing to the high level of freight charges on the Government Railway; and the problem of obtaining an adequate supply of labour.

1. The Need for More Railways

The mines on the Tarkwa and Obuasi goldfields, through which the Government railway passed, benefited from their newfound accessibility, but other companies were less fortunate in their continuing isolation from modern transport lines. Consequently, further proposals for branch lines to reach other mining properties were put forward. For example, the development of the mines of Bibiani Ltd., registered in 1900, was hampered above all by inaccessibility, and the enormous cost of transporting plant and machinery by head loads from Cape Coast, a distance by hammock path of some 150 miles. The company proposed as early as August 1901, in a letter to the Colonial Office, that their property should be put into direct communication with the proposed Sekondi-Kumasi railway, but their request was turned down (C096/393). Although the arrival of the railway at Dunkwa in 1902

alleviated considerably the financial position of the company, supplies still had to be carried by road some 70 miles from the railhead to the mine. The financial position of the company gradually deteriorated, and in 1913, the company was forced to close down after having produced 212,000 ounces of gold, valued at some £890,000. The annual expenditure of some £6,500 on road transport alone had proved too high a burden on the company's limited finances. Other mining companies in the same area were similarly disappointed by the Colonial Office's refusal to sanction this line. In a minuted comment on a letter, dated 12 February 1913, from Ashanti Rivers and Concessions Ltd., an official wrote,

"It is highly unlikely that this line will be constructed by the Government at any time in the near future, as all the papers here go to show that the line would only benefit the Companies and the Government has other fish to fry"
(CO96/540).

To this day, the Bibiani goldfield is without a direct rail link, although in 1944, a branch line was constructed to nearby Awaso to transport bauxite from the Kanaiyerebo mine. The premature closure of Bibiani Ltd. in 1913 was a fate shared by many other companies in similarly inaccessible locations, and only the mines along or within a reasonable distance of the railway survived.

Although the authorities would not sanction the construction of railways by private companies, approval was given to the construction of light railways or tramlines for internal use on the mining properties. By 1907, there were two such private lines, the first from Fura to Broomasie, and the second from Dunkwa to Attasi. These light tramways served a limited use and could not compare with the direct rail links to the coast. To take the transport problems of the Prestea district as an illustration, the means of communication between the Coast and

the Prestea range at that time comprised an awkward and costly combination of river and tramway transport. Goods were first carried by boat on the Ancobra river some 40 miles from the port of Axim to Fura, and thence by light railway some 26 miles to the mines. This route was unsatisfactory owing to the bar at the mouth of the Ancobra, the fluctuations in the river level, and the cost involved. On these grounds, therefore, the companies requested that a branch line be built from Tarkwa to Prestea, a short distance of about 20 miles, stating that,

"... the whole of the development of the properties on the Prestea range must come to a standstill pending the building of the line" (CO 96/464; Fanti Mines to C.O., 17 July, 1907).

In contrast to Bibiani's unsuccessful bid for a branch line the Colonial Office authorised the Tarkwa Prestea line in February 1908. The line was virtually complete by the end of 1910, and production increased dramatically; at Prestea Block A, gold production rose from 20,000 ounces in 1910 to over 100,000 ounces in 1914, and its neighbour, the Broomasie mine, doubled its output over the same period. The future of the mines on the Prestea goldfield had thereby been secured, and this serves to re-emphasise the inter-relationship between cheap and effective means of transport and the survival power of the gold mining companies in the early years of its development.

2. Railway Rates

The construction of the Government railway was an important factor, if not the most important single factor, in inducing capitalists to venture their money in Gold Coast mining. However, a contentious problem arose over the scale of freight rates charged on the carriage of mining machinery and supplies on the Government railway. The companies contended that the level of charges was prejudicial to the

full development of the industry, and particularly so to the opening up of the low-grade banket ores. Twelve companies with interests on the Tarkwa goldfield were signatories to a petition handed to the Colonial authorities on this issue, and this was backed up by an endless flow of complaining letters from other companies on the subject. It was pointed out, for example, by the Akrokkerri (Ashanti) Mines Ltd., in a letter dated 4 March 1904, that the cost of carriage of equipment on the Government railway to their property, located some 132 miles inland, was almost as much as the prime cost of the equipment itself (CO 96/424). A number of small concessions were given, but the revised schedule of rates still made uneconomical some of the concerns working low-grade ores. Secondly, many of the smaller and undercapitalised companies showed losses, and went into liquidation. The larger companies survived, nevertheless, and in some cases high dividends were paid to their shareholders. The success of these few merely showed that the failure of the many was due to other factors, such as incapable management. In these terms, the controversy over railway rates assumed an exaggerated importance since as far as the evidence suggests, the main effect of the prevailing level of freight charges was to produce a rational development of the gold mining industry by a small number of bona fide companies. On the Tarkwa goldfield, many of the smaller companies amalgamated to achieve economies of scale, which in the event was the most rational means of developing these low-grade properties. In other words, the problem of high freight rates on the railway was a temporary issue, and only affected the smaller companies which might not have survived for long in any case. But, for the companies which survived, there was one final problem which hindered the development of the industry in this period, that of obtaining an adequate supply of labour.

3. Labour Supply

Finally, the inadequacy of labour supply, both in quantity and quality, was an added constraint on the rapid growth of the gold mining industry. Indeed, shortages of labour were apparent from the outset of modern mining in the late 1870s, became more acute once the industry had become solidly established after the turn of the century, and have persisted throughout the history of the industry. Thus, while labour shortages were not unique to the period under discussion, they proved to be a relatively more important constraint on the progress of gold mining in the period 1902-1930 than at other times. In the pioneering years, carrier labour was difficult to obtain and more difficult to retain, and, once the mining machinery had been installed on the properties following the coming of the railway, labour to work on the mines was even more difficult to secure.

According to the population estimates for the Gold Coast in 1891, the total population was just over 1,500,000, of whom 907,000 lived in the Colony, 314,000 in Ashanti and 429,000 in the Northern Territories. The human resources of the country were therefore limited, and, in terms of quality, only a small core of skilled artisans, fostered by the Basel Mission, existed from which the mines could draw their requirements. Since the majority of the local inhabitants were engaged in the traditional sectors of the economy, a reason for the failure of most of the early gold-prospecting expeditions was the difficulty of obtaining labour. Before commercial mining was established in 1877, many foreign expeditions had visited the coast with the hope of establishing gold mining companies. But all had failed in their attempts owing, inter alia, to the difficulty experienced in obtaining carriers for their tools and stores. One traveller, on a visit to the

gold fields of the Wassaw district in 1877, related this problem,

"A shilling a day wages and threepence per day subsistence was offered, accepted, and declined half a dozen times a day" (Skertchley, 1878, p.274).

The general pattern seemed to be that carriers once engaged would fail to turn up at the required time, or disappear en route, which made for chaos in the carriage of goods into the interior.

However, once inland and on arrival at the sites of native gold 'mining', there appeared to be no shortage of labour from which the pioneer companies could draw their requirements, as the following selected extracts from contemporary documents show:

"At the time of our arrival, there were upwards of 6000 men and women at Tacquah (Tarkwa) all engaged in working the gold" (Skertchley, 1878, p.277);

"... large numbers (of natives) from different parts of the Country averaging about 5000 people have resorted to the Mining districts in search of employment" (Blue Book, 1880, p.323);

"At the period of my visit (to the Tarkwa area) there must have been about 1000 natives at work, sinking and driving .." (Mr C.J.Harvey's report, dated 18 May 1878, quoted in Whitelaw, 1929, p.5);

"... there are at present 1306 natives working at the Tacquah Mines and the number is increasing every day" (M.Bonnat's report, dated January 12, 1879, quoted in Holmes, 1926, p.81).

Even as far inland as Bibiani, some 120 miles from the coast, the then Consulting Engineer of Bibianaha Goldfields Ltd., Kendrick, estimated in his report of April 3, 1900, that there were between 10,000 and 12,000 natives living in villages on the company's property (CO 96/372).

From these extracts, it might appear that the pioneering companies at least had no great difficulty in obtaining labour to work on their mines. However, when the situation is studied more closely, it seems that these figures taken alone give a very misleading impression of the state of the labour market, since the local inhabitants, being unused to industrial work, could not be relied upon to give regular

service, and most would engage only for one month at any time, and in some cases for even shorter periods. Indeed, other evidence suggests that labour shortages were felt from the inception of commercial mining. As long as the mining companies were engaged in the preliminary work of preparing their properties for mining, such as the clearing of the bush, the erection of buildings and the transport of machinery from the coast, the supply of labour was adequate if inefficient. But, as soon as crushing operations began, the shortage of labour, particularly for underground work, became apparent. The Acting Civil Commissioner of the Tarkwa District, writing in 1882, stated that,

"The natives of these parts are bad workers, and are employed as little as possible at the mines ..."

Initially, to supplement the domestic supply of labour, the mining companies imported men, particularly Kroos and Bassahs. But, again, these men were generally engaged for a mere twelve months and then returned home. According to the first Annual Report of the Mines Department,

"The best carriers are drawn from the Hausa tribes, who are capable of carrying loads of 100 to 150 lbs for a distance of 10 or 12 miles a day" (A.R.M.D., 1903, p.30).

Another contemporary document stated that the labour on the mines of the Tarkwa goldfield was made up of local Fantis, who did the light work, as hammock-bearing, while the imported Kroo and Bassah men were preferred for the heavier work (Halse, 1890/91). Table 4.2 sets out the tribal origin of the mines labour force for the year 1903, and it illustrates clearly that the local inhabitants did not provide all the immediate labour needs of the industry. During the early years of modern gold mining, therefore, labour shortages can be said to have had a marginal effect on the progress of the industry in the sense that distant sources had to be tapped to fulfil the industry's requirements.

TABLE 4.2

ORIGIN OF LABOUR IN GOLD MINING INDUSTRY, 1903

<u>Place of Origin</u>	<u>Number</u>	<u>% Labour Force</u>
<u>FOREIGN COUNTRIES</u>	<u>3228</u>	<u>18.94</u>
Kroo	2382	13.97
Bassah	846	4.97
<u>BRITISH COLONIES</u>	<u>2329</u>	<u>13.67</u>
Mendi	743	4.36
Lagos	1187	6.97
Hausa	399	2.34
<u>GOLD COAST</u>	<u>11487</u>	<u>67.39</u>
Ashanti	2766	16.22
Fanti	6545	38.40
Krepi	1934	11.35
Appolonian	242	1.42
<u>TOTAL</u>	<u>17044</u>	<u>100.00</u>

Source: A.R.M.D., 1904

Nevertheless, compared with the other problems of the period, particularly the lack of modern transport, this problem assumed a relatively minor role in influencing the slow pace of development.

With the proliferation of companies during the boom at the turn of the century, and the installation of machinery on all the main goldfields made possible by the construction of the railway, the question of labour supply for the gold mines became paramount. With the problem of transport at least partially solved, it became clear that many of the companies would fail, at least in part because of their inability to satisfy their labour requirements locally. Hence, several schemes for importing labour on a large scale were suggested. For example, Lord Harris, writing to the Colonial Office on behalf of mining interests in the Gold Coast, stated in a letter, dated 30 June 1901, that the chief mining companies would accept an order modelled on that of Trinidad, involving the importation of Indian coolie labour; this proposal was backed up by a deputation of mine managers to the Secretary of State for the Colonies, who suggested that alternatively 500 Chinese should be brought into the country on a trial basis (CO 96/393/22940). This idea was not new; Burton and Cameron visiting the Gold Coast twenty years earlier had strongly advocated the importation of coolie labour to work on the gold mines. Again, in a letter dated July 10, 1901, L.P.Bowler pointed out that,

" ... the most important factor in facilitating the rapid development of the mining industry of the Gold Coast is the supply of cheap and reliable labour",

and to this end, he suggested that the Colonial Office should sanction the importation of labour that could cope with the climate, mentioning as possibilities Indian coolies, Chinese, or Shangaans of East Africa (CO 96/391). None of these various proposals was ever given official

authorisation and the reasons were minuted in reply to a similar suggestion in J.Moffat's letter to the Colonial Office of 26 July 1912,

- "1. Indian coolies in Fiji, British Guiana etc. are agricultural not mining labourers, and would not take to mining work.
2. There would be no opening for such indentured labourers in Gold Coast when their service was ended.
3. The climate would not suit.
4. The labour difficulty is not yet so acute as to call for any outside assistance" (CO 96/526).

Competition for labour from other sources of employment was seen by the mining companies to be the major cause of labour shortages in the mining industry, and road and railway construction, harbour works, load carrying (for example, during the Ashanti uprising of 1900 when carriers were diverted to military purposes), and cocoa farming were all cited. Surprisingly, the companies even objected to the competition for local labour which inevitably arose when the lines of railway were being constructed to Tarkwa, to Kumasi and later to Prestea. The fact that the railways were built in the first instance to serve the mining industry seemed irrelevant when it meant that their labour supplies were threatened! The companies even suggested that labour should be imported from Lagos or the Northern Territories to work on the railways so that the local inhabitants would be free to take up employment on the mines. The Directors of Prestea Block A (one of the gold mining companies working on the Prestea goldfield) went as far as proposing in a letter, dated 21 October 1908, that no natives should be recruited for railway work within a forty-mile radius of Tarkwa (CO 96/478). And, in a further letter, dated 10 December 1910, the same company complained to the Colonial Office that,

"There are large villages adjacent the Mine Camp and isolated as these are from other parts, except for bush tracks, a large part of the population has been available for our mine. The opening of the railway, while being a boon in other respects, will enable labour to drift more easily to the Tarquah field" (CO 96/504).

From all the conflicting evidence, it seems that the mining companies, while undoubtedly suffering from periodic shortages of labour and having a limited choice of labour of the required quality for mining work, were prone to exaggerate the magnitude of the shortages, because according to the annual statistics of the Mines Department, the numbers employed in mining grew from some 12,000 in 1905 to 20,000 by 1910.

One possible reason for the recurring complaints from the companies concerning the supply of labour perhaps lies in their failure to stabilise the labour force, despite efforts to do so. When the industry began on a large scale at the turn of the century, they established native villages at great expense in the hope that the natives would take up permanent residence and settle down to mining work, thereby creating for the mining industry a stable labour force. The first of such villages was at Effuenta, and others were laid out subsequently at Abbontiakoon, Fanti mines, Adjah Bippo, Abosso, Tacquah, Cinnamon Bippo, all located on the Tarkwa goldfield, and at Prestea. The mining companies pulled down the haphazard groups of buildings which had grown up around the mining works when the mines first started on a commercial basis in the late nineteenth century, and in their place they erected proper villages in which the houses were systematically built with good spaces left between the houses. The rebuilding of these villages had stopped epidemics, which had impaired the efficiency of labour in the earlier period, and at the same time the existence of these orderly villages had induced a number of foreign natives to settle permanently around the mines (A.R.M.D., 1903/4, p.31). Practically every village was under European supervision, with a Medical Officer in charge of sanitation. Thus, as early as 1900, the mining companies had attempted to stabilise the labour force in the belief that good

housing conditions would induce the native labourers to serve long periods in the industry, acquire the necessary skills and thereby provide the industry in turn with an efficient and reliable labour force. But for various reasons the degree of permanency hoped for did not materialise. First, between 1903 and 1908, when a number of the mines were closed down after the collapse of the boom, most of the villages were allowed to get out of control, and as a result people with no connection with the mining industry whatsoever, settled in these villages. This period of inaction brought about the recurrence of epidemics as sanitation arrangements were allowed to slip and the houses became overcrowded and fell into disrepair. The result was that

" ... natives in the Gold Coast simply squat in their (companies') villages and come to work when they feel inclined to do so"
 (CO 96/503: Gold Coast Amalgamated Mines Ltd. to the Colonial Office, 1 November 1910).

Thus, while the mines had attracted large numbers of people to settle in or around the mining areas, the majority of these people had no connection with the industry. This in itself re-emphasised the labour shortages suffered by the industry, although in many ways it was the fault of the mining companies themselves. Some of the smaller companies, set up in the general enthusiasm created in the boom at the turn of the century, put their mines on a care and maintenance basis until such time as the larger and more heavily-capitalised companies had proved that gold mining in the Gold Coast would pay. This policy was partly responsible for the lack of control in the mining settlements in the first decade of the twentieth century. In order to offset the apparent apathy of the local inhabitants to mining work, the operating companies were forced to offer higher wages than those adopted by the local Mine Managers Association, and this in itself forced many of the smaller companies to close, since production costs were still relatively high

at that period. The minimum wage rates of the period were quoted as 1s 6d per diem for miners, 1s 9d for shaftsmen, 1s 3d for surface labourers, between 3s and 3s 6d for fitters and between 2s 6d and 3s 6d per diem for carpenters (A.R.M.D., 1904).

Several companies had reached the profit-making stage by the middle of the first decade of the twentieth century, and this encouraged expansion in the industry. For example, for the year 1905/6, the Abosso Gold Mining Co. Ltd. declared a profit of £56,136 of which £34,950 was absorbed by the payment of a 10% dividend to their shareholders; Bibiani Goldfields Ltd. declared a profit of £41,184; and Ashanti Goldfields Corporation a profit of £40,454 (A.R.M.D., 1906). Under these circumstances, it was vital that the industry should be able to tap an adequate supply of labour to cope with the planned expansion in the industry. Since the Colonial Office would not sanction the large-scale importation of labour from outside West Africa, the companies turned to the Northern Territories of the Gold Coast for an alternative source of labour to make up the deficiency in the local supply. To this end, in December 1905, some thirty labour representatives were brought from the North by the Gold Coast Government Transport Department (which at that time was the body responsible for labour) so that they could see the different kinds of work and the living conditions in the mining districts in the South. This experiment was slow to accelerate, and by 1907 there were only 280 men from the North employed in the various works on the mines compared to a total labour force of some 14,700 for that year. Indeed, the northern component of the mines' labour force remained small for some time, largely because of the poor recruiting arrangements.

Recruiting of men in the north was carried out by the District Commissioners with the help of the local Chiefs. The Chief Commissioner, then A.E.Watherston, was extremely enthusiastic about the scheme and in order to encourage the local Chiefs to co-operate he suggested that head-money should be paid to the Chiefs for the men they provided (1953 Acc.No.1292, G.N.A., Letter of 2 September 1907, Watherston to Colonial Secretary). This arrangement was held satisfactory by the mining companies, and payment of the head-money was made through the Mines Department (1953 Acc.No.1296, G.N.A., Letter of 2 September 1909, Watherston to Commissioners). But the scheme failed in part due to the 'wastage' incurred through ill-health of many of the men sent south or through desertion en route, to cocoa-farming in particular, and in part due to the absence of formal contracts between the employer and employee. The lack of binding contracts on the mining labourers was in fact one of the causes of the general instability of the mines' labour force. The only law under which labour could be bound in service to an employer was the Masters and Servants Ordinance No.8 of 1893, the terms of which were not applicable to the mining industry. The companies, both individually and collectively, canvassed the Colonial Office for help in this matter. Proposals were put forward for labour legislation which would empower the companies to hold labour under contracts of between one and three years, and further that a Pass Law should be introduced to prevent desertion (CO 96/503; Notes on a meeting between Representatives of the Mining Industry and the Colonial Office, dated 2 November 1910). But nothing came of these proposals, and the lack of response from labour from the North was attributed time and time again to the lack of legislation with respect to the employment of men to work on the mines. Indeed, the Chief Commissioner for the

Northern Territories was disinclined to send further new recruits from the North until effective regulations concerning the employment of labour were agreed (CO 96/503; Letter from G.W.Murray to Colonial Office, 24 August 1910). The essence of the recruiting problem was summed up by the Head Chief of Mamprusi,

"A few of my people would doubtless be willing to go at once, but the question of future supplies of labourers would depend on the story which they would have to tell upon their return. If they come back rich, in possession of money and goods, and could tell their fellow-villagers that they had been well-fed and housed, as well as properly looked after, then I am sure that 100s of others would wish to work for you. The whole success of your proposals depends upon the manner in which the first few gangs are treated"
(Enclosure in Murray's letter, op.cit.).

In the light of these circumstances, and in particular in the light of the failure of the proposals concerning the establishment of formal contracts between the mines and the labourers, the labour shortage continued to harass the industry. In 1911, several of the mining companies started to bring labour from other Colonies in view of the poor local response of labour (A.R.M.D., 1911). Practically every country in West Africa supplied labour to the gold mining industry as a result of this new policy (Table 4.3).

Unfortunately, the progress of the industry was interrupted during the first world war, and the consequent diversion of labour from the mines to military purposes had a serious effect on production. The total strength of the mines' labour force dropped from some 19,000 in 1910/11, the peak development year in the industry, to under 10,000 by 1920. After the war ended, the gold mining industry was very slow in re-establishing full operations, especially since the cocoa industry experienced a boom in the immediate post-war years. This led to competition for labour, and the cocoa farmers paid unnecessarily high wages to attract men into cocoa farming. In turn, the mines suffered

TABLE 4.3

ORIGIN OF LABOUR IN GOLD MINING INDUSTRY, 1911

Place of Origin	Number	% Labour Force
<u>FOREIGN COUNTRIES</u>	<u>2370</u>	<u>15.5</u>
Dahomey	82	
French Guinea	168	
Liberia	1470	
Ivory Coast	285	
Togoland	365	
<u>BRITISH COLONIES</u>	<u>2161</u>	<u>14</u>
Gambia	222	
Northern Nigeria	263	
Southern Nigeria	1013	
Sierra Leone	663	
<u>GOLD COAST</u>	<u>10812</u>	<u>70.5</u>
Accra	468	
Appolonian	565	
Ashanti	2408	
Fanti	3204	
Krepi	985	
Northern Territories	1972	
Sefwhi	699	
Wassaw	511	
<u>TOTAL</u>	<u>15343</u>	<u>100</u>

Source: A.R.M.D., 1911.

as a considerable proportion of labour available locally was diverted from mining work into cocoa farming. The mining industry was in a depressed state as the result of the shortage of labour, which was described as the 'fons et origo' of its depression in the years after the first world war (A.R.M.D., 1920, p.1).

It is significant, however, that by 1920 some 56% of the labour force in the gold mining industry originated from the Gold Coast, and of this, one-third of the men came from the Northern Territories (Table 4.4). This position can be compared with the situation in the years prior to the outbreak of the first world war, when only 18% of the labourers originating in the Gold Coast came from the North. In absolute terms, however, the northern component of the labour force had not varied very much, being of the order of 2500 men in 1922 and 2000 in 1911. Further efforts to increase the number of recruits from the North in the 1920s were no more successful than they had been in the earlier period, since,

"The cost of recruiting was out of all proportion to the number of recruits and of those recruited many deserted before reaching the mines" (A.R.M.D., 1920, p.7).

The varying response of labour to the recruiting agents is set out in Table 4.5. It appears that the system of collecting and despatching Northern Territories' labour in gangs was disliked, and was one of the major causes of its failure. Equally, the schemes for importing labour from other neighbouring West African countries had proved a costly failure for the most part; the cost of transporting labourers from Liberia, for example, was some 37s per head, but it was found that the men gradually drifted away from the mines. By 1924, all the companies had stopped recruiting in Southern Nigeria, largely for the same reason.

TABLE 4.4

ORIGIN OF LABOUR IN GOLD MINING INDUSTRY, 1920

<u>Place of Origin</u>	<u>% Labour Force</u>
<u>FOREIGN COUNTRIES</u>	<u>28.36</u>
Dahomey	-
French Guinea	-
Ivory Coast	17.81
Liberia	8
Togoland	2.55
<u>BRITISH COLONIES</u>	<u>15.63</u>
Gambia	-
Northern Nigeria	2.81
Southern Nigeria	8.57
Sierra Leone	3.60
Others	0.65
<u>GOLD COAST</u>	<u>56.01</u>
Accra	2.32
Appolonian	3.64
Ashanti	12.42
Fanti	10.85
Krepi	2.31
Northern Territories	18.86
Sefwhi	1.44
Wassaw	4.17
<u>TOTAL</u>	<u>100.00</u>

Source: A.R.M.D., 1920.

TABLE 4.5

MONTHLY ARRIVALS OF INDENTURED LABOUR FROM THE
NORTHERN TERRITORIES, APRIL 1921 - MARCH 1923

Month	Number	Month	Number
April 1921	220	April 1922	5
May	315	May	5
June	12	June	0
July	168	July	115
August	88	August	325
September	45	September	75
October	60	October	125
November	320	November	365
December	380	December	605
January 1922	20	January 1923	520
February	312	February	95
March	410	March	0

Source: A.R.M.D., 1922/23.

No effective recruiting system was ever evolved, and the industry was forced to struggle on in the face of periodic shortages. Indeed, in the year 1925, all methods of formal recruiting were prohibited by order of the Secretary of State for the Colonies, on the basis of Professor William Simpson's report of 1924 on the sanitary conditions of the mining areas. This report pointed in particular to the appallingly high death rates among recruited labour compared with the local labourers. This trend was officially construed as resulting from indiscriminate recruiting by the mining companies, and this led to the banning of all formal recruiting. However, coincident with that decision, a number of voluntary labourers arrived at the mines from the Northern Territories and offered themselves for employment; of those, some 50 men had returned from previous service in the mining industry (A.R.M.D., 1924/25, p.6). From that time, the flow of labourers from the North became a permanent feature of the labour market, benefiting not only the gold mining industry but also other sectors of the economy.

A final characteristic of the labour situation in this period which deserves mention is the fact that the wage rates in the gold mining industry were raised substantially for the first time in the history of the industry (Table 4.6). These increases were adopted as a result of growing competition in the labour market from other sources of employment. There were three main sources of competition for labour: the cocoa industry, which was booming in the years following the first world war; the newly established manganese and diamond mining industries, which dated from 1916 and 1922 respectively; and the construction industry, which experienced a rapid growth following the implementation of the Guggisberg Ten-Year Development Plan, with its emphasis on

TABLE 4.6

NATIVE WAGE RATES IN GOLD MINING, 1918 and 1920

Occupation	<u>Average wage per shift</u>			
	<u>1918</u>		<u>1920</u>	
	Min.	Max.	Min.	Max.
Blacksmith	2s 6d	3s 6d	2s	7s 6d
Bricklayer	2s 6d	3s 6d	2s	4s 9d
Carpenter	2s	3s 6d	2s	10s
Cyanide hand	1s 6d	2s 6d	1s 3d	3s 9d
Fireman	1s 9d	2s 9d	1s 9d	3s 9d
Fitter	2s 6d	3s 6d	2s	10s
Hammer boy	2s	3s	1s 9d	4s
Pump boy	2s	3s	1s 9d	5s
Mill hand	1s 9d	2s 9d	1s 6d	4s 6d
Rockdrill boy	3s	4s	2s	5s
Shoveller	*1s 3d	1s 9d	1s 6d	4s 3d
Signal boy	1s 6d	2s	1s 6d	2s 6d
Spanner boy	2s 3d	2s 9d	2s 9d	3s 6d
Surface labourer	**1s 3d	1s 9d	1s 3d	2s 3d
Timberman	2s 3d	3s 3d	2s	7s
Trammer	1s 6d	2s	1s 3d	4s 3d
Winch driver	2s 6d	3s 6d	2s	4s 6d

Source: A.R.M.D., 1918 and 1920.

NOTE: The wage rates for the lowest paid workers, the underground* and surface labourers** were in 1918 unchanged from 1904.

infrastructural development. The mines could no longer continue their 'cheap labour' policy if they were to attract the required numbers of men into their employment.

CONCLUSION

The construction of the Government railway linking Kumasi with the coast, and passing through the Tarkwa and Obuasi goldfields, was the main stimulus to the spread of commercial mining inland during this period. While the companies set about installing new machinery, ordered on the expectation of the early completion of the rail link with the coast, production fell, and at the height of the boom in 1901, a mere 5223 ounces of gold, valued at £22,187, were produced; this was the lowest figure recorded for half a century.

With the large-scale equipment of the industry, following the arrival of the railway at Tarkwa in 1901, Obuasi in 1902, and with the completion of the branch line to Prestea in 1910, production increased steadily until the outbreak of the first world war. The demand for base metals during the war meant that supplies and fuel for the gold mining industry had a low priority in the allocation of shipping space. The industry became disorganised, and only the larger companies working properties close to the railway survived. The output of gold was severely curtailed under these wartime restrictions, and the downward trend intensified after 1918, largely owing to the acute shortage of labour, brought about by the boom in the cocoa market and the more general development which took place in the economy in the 1920s. As a result, over the period 1902-1930, the gold mining industry attained its peak output in 1914, when 410,655 ounces of gold, valued at £1,744,499, were produced.

In Chapter 5, the third major phase in the development of the gold mining industry is discussed, and the impact of the events of the 1930s are examined as they affected the geography of gold mining.



In Chapter 4, the development of gold mining in the late 19th and early 20th centuries is discussed. In the late 1800s, the gold mining industry was still in its infancy, and the impact of the events of the 1930s was not yet felt. The first major phase in the development of the gold mining industry was the discovery of gold in California in 1848. This discovery led to a massive influx of miners and capital into the state, and the gold mining industry became a major part of the state's economy. The second major phase in the development of the gold mining industry was the discovery of gold in Colorado in 1859. This discovery led to a massive influx of miners and capital into the state, and the gold mining industry became a major part of the state's economy. The third major phase in the development of the gold mining industry was the discovery of gold in Nevada in 1859. This discovery led to a massive influx of miners and capital into the state, and the gold mining industry became a major part of the state's economy. The impact of the events of the 1930s on the gold mining industry was significant. The Great Depression led to a sharp decline in the price of gold, and many gold mines were closed. However, the discovery of gold in the 1930s led to a resurgence in the industry, and the gold mining industry became a major part of the state's economy.

CHAPTER 5

THE HISTORICAL PERSPECTIVE:1931-1941 : THE RENAISSANCE OF GOLD MININGINTRODUCTION

In Chapter 4, the progress of gold mining in the Gold Coast up to 1930 was discussed. It was shown how the pace of mining quickened after the building of the railway; how the interruption of operations during the first world war acted as a brake on its progress; and how the industry was only slow to recover from that impact in the following decade. This slow rate of progress might have continued into the 1930s but for an unexpected turn of events which revitalised gold mining in 1931. It was in that year that the United Kingdom abandoned the gold standard, and as a result, the price of gold to the producers rose immediately from 84s 11½d to 135s per ounce. This stimulated a virtual renaissance of gold mining in the country, especially when it was realised that working costs would not rise in proportion to the new high price of gold and that there was no likelihood of an immediate return to the gold standard. The expansion of gold mining activity following this event and the new problems which attended this expansion are the subject of this chapter. In 1931, production was less than 250,000 ounces and only four companies were still in active production. However, the abandonment of the gold standard made old mines, which were of little commercial value at the former price, potentially very profitable, and opened up possibilities for the mining of lower-grade ore bodies. By 1941, there were 16 companies in production, and they produced some 882,000 ounces of gold, valued at nearly £7,500,00, in that year. The tripling of production within a decade was due both to

the geographic spread of gold mining and to the enlarged capacity of the industry resulting from the increased scale of capital investment in gold mining in the 1930s.

GEOGRAPHIC EXPANSION

The sudden increase in the price of gold stimulated a marked revival of interest in the gold deposits of the Gold Coast, and led to an avalanche of enquiries for information regarding abandoned mines and gold prospects in the country generally. Very little published material existed on the distribution of gold prospects except that contained in the Annual Reports of the Mines Department, and the Geological Survey, and these were very generalised. In order to provide interested parties with information about the gold resources, the Geological Survey began a comprehensive study of the known and potential auriferous districts of the Colony and Ashanti. The survey included both field investigation and the collation of documents relating to gold mining activities in the past. The survey was begun in 1931 and its results were published in the Gold Coast Geological Survey Memoir No.4 (Junner, 1935). By the time the survey was completed, the producing mines were making good profits and many dormant mines had been reopened. At the same time, dredging for gold had become an economic possibility, in effect for the first time in the history of the industry.

Of course, the general circumstances prevailing in the 1930s were more favourable to profitable mining than ever before. There were now 500 miles of railway and some 6000 to 7000 miles of motor roads and a modern harbour at Takoradi; sanitation was vastly superior to the earlier period; mining and metallurgy had improved to allow a

better recovery of gold and permit lower mining costs. At the same time, the revival of gold mining coincided with a depression in the cocoa industry, so that surplus labour was available for the mines whose requirements had increased. However, notwithstanding the local advantages which favoured successful mining activity in the 1930s compared to the earlier period, it was essentially the external stimulus of the 58% increase in the price of gold which led to the renaissance of gold mining and the consequent geographic expansion. Many of the large mining houses, such as Consolidated Goldfields of South Africa, gave their financial support to the industry in the Gold Coast, and that financial backing ensured that the industry had a better chance than ever of making rapid progress. The entry of these large mining houses into the field also increased the market value of the existing companies (Table 5.1), and the inflow of fresh capital which followed permitted reconstruction and expansion of operations on existing mining sites and the spread of mining to new areas.

One of the main features of the geographic expansion of gold mining in the 1930s was that, apart from the normal exploration and development of ore-bodies usually carried out to keep ore reserves ahead of production, exploration and prospecting were undertaken on a much larger scale than before, and wider areas encompassed by these activities. In 1928, an exploratory company was formed, namely the Gold Coast Selection Trust, which acquired large tracts of land in the country, but it was not until 1932-33, encouraged by the new high price of gold, that the Trust began active field work on the concessions and options it had acquired earlier for the purpose of developing and floating gold mining companies. The Trust controlled practically the whole line of reefs between the Ariston mine (on the Prestea goldfield)

TABLE 5.1

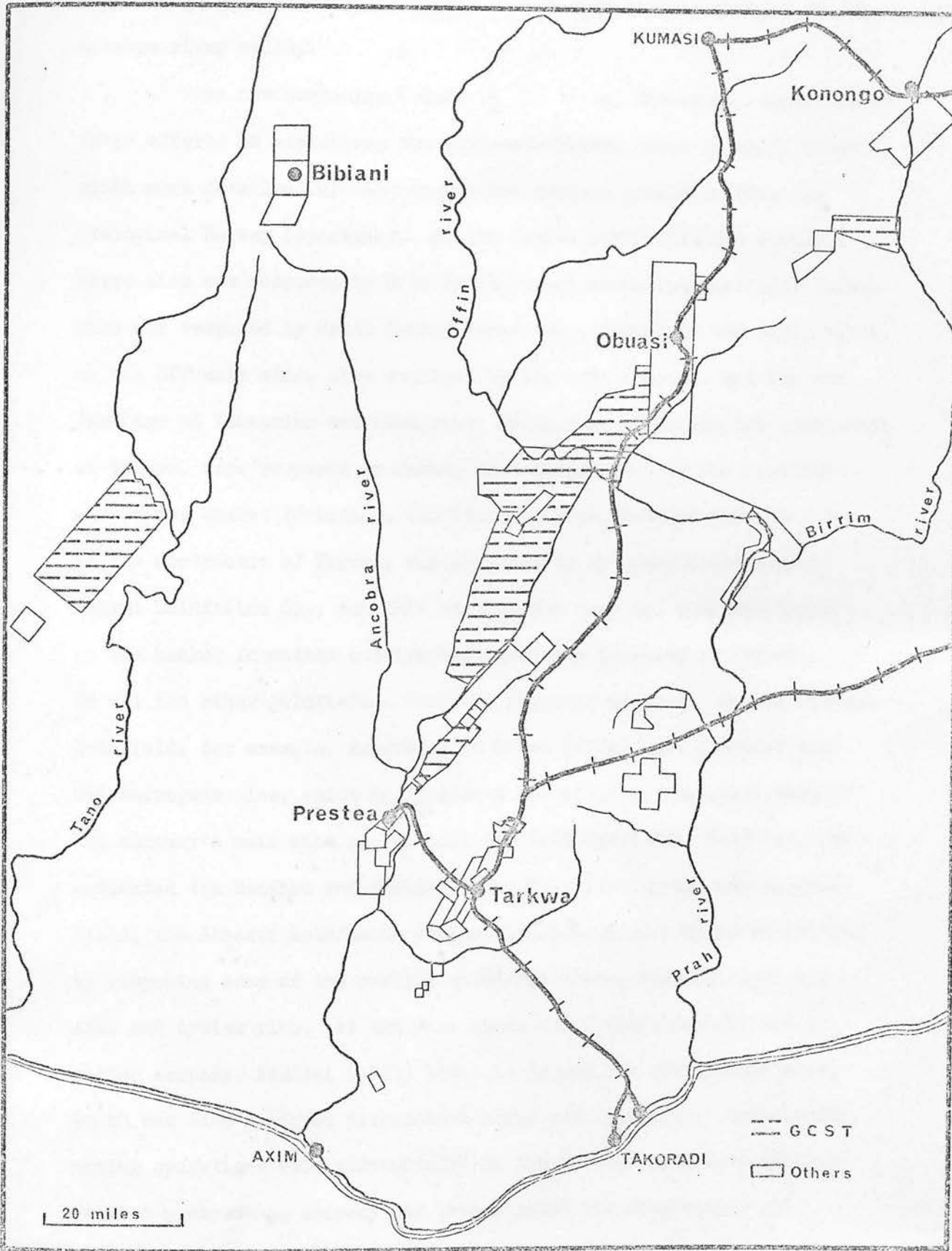
SHARE QUOTATIONS FOR THE GOLD COAST MINING COMPANIES,
mid-1934

Company	Nominal Value		Ruling Prices	
	s	d	s	d
Akim (1928) Ltd.	2	6	6	3
Appolonia Goldfields Ltd.	1	-	3	-
Ariston Gold Mines (1929) Ltd.	2	6	11	9
Ashanti-Adowensa (Banket) Ltd.	4	-	3	3
Ashanti Goldfields Corpn., Ltd.	4	-	44	6
Atta Gold Company (1928) Ltd.	2	-	9	-
Bibiani (1927) Ltd.	4	-	29	-
Central Wassaw Gold Mines Ltd.	1	-	4	-
Fanti Mines Ltd.	5	-	2	-
Gold Coast Main Reef Ltd.	5	-	8	-
Gold Coast Banket Areas Ltd.	2	-	4	6
Gold Coast Selection Trust, Ltd.	5	-	45	-
Konongo Gold Mines, Ltd.	2	-	4	9
Kwahu Mining (1925) Ltd.	2	-	62	-
Lyndhurst Deep Level, Ltd.	1	-	4	9
North Ashanti Mining Co. Ltd.	4	-	5	-
Obuom Gold Mines Ltd.	5	-	13	6
South Banket Areas, Ltd.	2	-	2	10 $\frac{1}{2}$
Taquah & Abooso Mines, Ltd.	4	-	29	9
Tarkwa Banket West Ltd.	1	-	8	7 $\frac{1}{2}$
<hr/>				
Tarkwa Gold Mines Ltd.				
Marlu Gold Mining Areas, Ltd.				
Gold Coast Associated Cos., Ltd.				

Source: J.R. Williamson & Co., July 1934.

and the Ashanti mines (on the Obuasi goldfield) as well as several outlying properties (Map 5.1). The Trust's concessions were all closely mapped, and the promising occurrences of gold were tested by trenching, pitting and diamond drilling. Its activities reached a peak in 1935-36, when up to 50 European geologists and mining engineers were employed by the company in evaluating the various properties. In spite of the wide area covered by the Trust's prospecting programme (as indeed that of the Geological Survey carried out simultaneously) the geography of gold mining was not affected dramatically. The Trust erected a treatment plant on a promising prospect at Bibiani North, but it proved short-lived, and the Trust finally ceased field operations in 1940. Only one important discovery was made in this period, that of the oxidised surface deposits at Bogoso, situated on the Enchi road some seven miles west of the Insu railway station. The Marlu Gold Mining Areas Co. Ltd. was formed in 1934 to work these surface ores.

The second important feature of the expansion of gold mining in the renaissance period was the reopening of old, abandoned mines in and around the existing mining centres, or the development of new mines adjacent to the existing mines. Thus, in geographic terms, gold mining activity was merely intensified around the five core areas established at the beginning of the century. Gold mining operations had been found to be most profitable along the reef extensions already proved at Tarkwa, Prestea, Obuasi, Bibiani and Konongo, and the expansion of mining activity in the 1930s represented no more than the lateral spread of mining around these long-established centres. The revival of gold-dredging in the 1930s was also no more than a renaissance of activity along the same river valleys worked in the earlier period. No fresh dredging grounds came to light, in spite



GOLD COAST SELECTION TRUST: concessions

of the intensity of exploration work done at that period. The Bremang Gold Dredging Co. was formed to rework the gold-bearing gravels of the Ancobra river valley.

The new companies formed in the 1930s, therefore, concentrated their efforts on exploiting the long-established lines of reefs about which more detailed information was now readily available from the Geological Survey Department. On the Tarkwa goldfield, the Cinnamon Bippo mine was reopened by Gold Coast Banket Areas Ltd. in 1933; Tamsco mine was reopened by South Banket Areas Ltd., formed in the early 1930s, as was Effuenta mine, also acquired by the same company; and the old workings at Iduapriem and Eduapriem, lying some six miles due south-west of Tarkwa, were reopened by Tarkwa Gold Mines Ltd. At the northern end of the banket formation, the Ntranang mine, located some 80 miles to the north-east of Tarkwa, was reopened by the Ashanti-Adowsena Banket Goldfields Co., and this mine is the only one ever developed on the banket formation outwith the immediate locality of Tarkwa. On all the other goldfields, the same sequence applied. On the Prestea goldfield, for example, Ariston Gold Mines (1929) Ltd. reopened the old Anfarguah mine, which is located a few miles to the south-west of the company's main mine at Prestea; and Gold Coast Main Reef Ltd. re-activated the Bondaye and Tuappim mines in 1933. On the Obuasi goldfield, the Ashanti Goldfields Corporation intensified their activities by reopening some of the earlier abandoned mines, such as Justice's mine and Ayeinm mine. At the same time, the Corporation floated a sister company, Bibiani (1927) Ltd., to reopen the old Bibiani mine, which was then equipped with modern plant and machinery. And finally, mining operations were resuscitated on the Konongo goldfield after a Swedish prospecting company had investigated the feasibility of

profitable mining on behalf of Konongo Gold Mines, registered in 1933, and Lyndhurst Deep Level (Silver and Gold) Ltd. A smaller company, the Obuom Gold Mines Ltd., reopened the Obuom mine, located south of Konongo.

It can be seen from the foregoing discussion that a relatively small number of companies was responsible for the renaissance of gold mining in the Gold Coast in the 1930s. Many more companies were floated than survived to reach the producing stage; most ceased when it became evident that the gold resources of the country could not support more than a handful of companies since the gold deposits were not of sufficient extent or richness to do so. This decade is notable, nevertheless, in that the maximum number of companies engaged in field operations and in gold production were recorded at this stage in the history of the industry; in 1935-36, no less than 31 companies were engaged on active work on their concessions, of which 28 were recorded as working lode deposits and 3 working alluvial deposits. Of those 31 companies, only 10 were actually producing gold, however. It was nearer the end of the decade that the maximum number of companies producing gold in any one year was recorded; in 1939-40 and 1940-41, 16 companies had reached the producing stage, of which 14 won gold from lode deposits and 2 won gold from alluvial sources. The fresh capital invested in gold mining in the Gold Coast at the beginning of the decade had begun to bear fruit; gold exports showed an increase of nearly 300% in 1941 over 1931.

INCREASING THE SCALE OF OPERATIONS

This vast increase in gold production between 1931 and 1941 can be explained not only in terms of the increase in the number of operating mines, but also in terms of the increased scale of mining adopted in the 1930s. Long-term plans were drawn up, by the existing or reconstructed companies, with a view to stepping up the tonnages mined. The main features of these plans were the provision of new shafts, the deepening and re-equipping of the existing shafts, and the construction of new treatment plants with larger milling capacity to accommodate the planned expansion of mining. It was realised that, given the new high price of gold, the best way to ensure the long-term survival of gold mining was through economies of scale, and to this end, all the mining companies adopted similar plans to reconstruct and modernise their physical assets. Thus, an era of shaft-sinking and plant construction began, reaching a maximum just prior to the second world war.

1. Shaft-sinking

On the Tarkwa goldfield, Amalgamated Banket Areas Ltd., formed in 1935 after the amalgamation of several contiguous concessions, and the Taquah and Abosso company prepared to step up production by first sinking new shafts. On the Abbontiakoon section of the former company's property, the existing main incline shaft was replaced by a vertical shaft to intersect the reef at about 18 level, close to the synclinal axis of the banket series at this elevation underground. This was the Abbontiakoon Vertical Shaft (A.V.S.) and sinking began in 1936. At the same time, the company started on a second vertical shaft to open up the Mantrain section of its property further south. This new

shaft, the Mantrain Vertical Shaft (M.V.S.) was sunk some 1400 feet and eventually connected on the bottom level by a cross-cut, some 3000 feet long, to the Taquah mine which had been dewatered for reopening. The property of the Taquah and Abosso company was served by two incline shafts in the early 1930s. These shafts, the Abosso and Adjah Bippo shafts, were, under the expansion programme, connected by a reef drive at 13 level, and below this horizon the mine was served by an internal incline shaft down to the 20 level. However, the hoisting capacity of these shafts was inadequate for the higher rate of output planned for the future and a new shaft, the Huni Vertical Shaft, was therefore sunk in 1935 to allow the development of the deeper levels within the mine. This shaft was sunk some 2400 feet and intersected the reef at the 26 level.

Similar improvements were made on the mines of the Prestea goldfield, where at the mine of the Ariston company, the Prestea shaft, a compound shaft, which served the mine down to 21 level, was in a very bad state of repair by the 1930s. It was therefore replaced by a new vertical shaft, sunk some 3100 feet to 24 level; called the Central shaft, it was the first of the modern shafts to be sunk in the country. On the adjacent property of Gold Coast Main Reef Ltd., no new shafts were constructed, but the existing ones were re-equipped and subsequently deepened as required.

In the case of Ashanti Goldfields Corporation, the planning staff decided that it would be more economic to explore the mine in depth from the existing shafts before embarking on a costly programme of shaft-sinking. It was not until after the second world war, therefore, that the new 18-foot diameter Eaton Turner Shaft was sunk and reached its final depth of some 4354 feet as recently as 1956.

But the corporation's sister mine at Bibiani was immediately re-equipped with a modern Central shaft to replace the old No.4 shaft which was in bad repair and had a limited hoisting capacity.

On the Konongo goldfield, the main innovation of the period was the sinking of a new vertical shaft, the Odumase Shaft, to develop the Odumase reef, while the other sections of the mine continued to be served from existing shafts.

2. Plant Construction

To complement the enlarged hoisting capacities of the new shafts, new treatment plants were designed and built in line with contemporary developments in metallurgy. At Abbontiakoon, the old 9000-ton capacity stamp and tube mill was replaced by a new plant designed with an eventual capacity of some 60,000 tons. The new plant commenced milling in 1940, but was put on a 'care and maintenance' basis during the latter part of the second world war, and did not resume operations until 1946. Similarly, the Taquah and Abooso company constructed a new plant, raising the capacity of the mill from the older rate of 12,000 tons per month to a new rate of 20,000 tons per month. Their new plant began operating in 1936.

At Ariston, a new treatment plant was designed for a capacity of 30,000 tons per month, and a smaller mill was built by the neighbouring company, Gold Coast Main Reef, to treat between 8000 and 10,000 tons of ore per month. The former began milling in 1939, the latter earlier, in 1936.

At Obuasi, the Ashanti company did not build its new treatment plant until after the second world war, when a new plant designed to treat some 30,000 tons of ore per month was constructed, although it was not put into commission until 1949. But on the corporation's

sister mine at Bibiani, a pilot plant was erected in 1933 for experimental purposes to determine the best form of ore treatment for the Bibiani ores, which differ substantially from those found elsewhere in the country. Once the most suitable metallurgical process was discovered, the company embarked on the construction of a large milling plant which was completed by 1939.

At Konongo, a new mill was constructed in 1936 with an initial capacity of 6000 tons per month, which was later increased to treat up to 10,000 tons of ore per month. This plant served both the Konongo company and its neighbour, the Lyndhurst company; both companies were eventually merged under one management to achieve economies of scale.

These were, therefore, the main aspects of the expansion programmes undertaken in the 1930s. These measures, combined with improvements in the treatment of ores adopted simultaneously, largely account for the marked increase in gold production recorded by the industry in the 1930s decade.

OTHER IMPROVEMENTS OF THE DECADE

In addition to the physical enlargement of the capacity of the gold mining industry in the renaissance period, considerable improvements were made in other ways, which helped to put the industry on a more solid basis than ever before. There was the question of securing an adequate source of power, now demanded on a larger scale owing to the increased scale of mining activity, and secondly, the mining companies were faced with improving the sanitation and living conditions in the mining villages, as well as improving the terms of staff contracts to attract highly-qualified specialists into the industry in the Gold Coast.

1. Power Supply

There are no coal deposits in Ghana, and in the early 1930s, when the second expansion and large-scale reconstruction of the industry began, the principal source of power in use on the mines was steam raised from wood-fired boilers. On only a few mines were wood-producer gas engines and diesel-oil engines in use. From the inception of modern mining, one of the advantages of the gold mines' location in the forest belt had been the ready availability of timber for fuel. Indeed, most of the mining companies acquired the timber-cutting rights in addition to the mining rights on their concessions; otherwise, separate timber concessions were leased for that purpose. However, the terms of such leases were such as not to require replanting, so that the areas adjacent to the mines were quickly denuded of timber. The sources of supply thus became increasingly more distant and transport a serious problem. From time to time, the mines had experimented with the use of coal to generate power, but it was found to be too costly, and all such schemes were soon abandoned. Moreover, the firewood-cutting operations were generally contracted out to native contractors,

"... who had no illusions about the importance of their work to the mines and who by their demands and strikes frequently placed the power supply in jeopardy" (Allen, 1958, p.231).

As a result of these circumstances, a review of the power supply situation was undertaken in 1935 in the light of the increased power requirements of the industry as new shafts were sunk and new mills erected. The main problem was to decide whether it would be better to provide a central source of power for all or various groups of mines, or to expand the capacity of individual stations.

An interesting proposal for centralising the power supply had been put forward by the North Ashanti Mining Company. They suggested

that its subsidiary company, the Prah H.E.P.Exploration Ltd., could supply hydro-electric power to the gold mines by harnessing the Busimassi rapids on the Prah river. In May 1931, the parent company applied to the Colonial Office for a licence for that purpose, but official reaction to the scheme was negative. Indeed, both official and unofficial circles regarded the project with great suspicion. It was thought that the company was merely trying to 'hawk' around on the Stock Exchange for financial backing for itself, using this scheme as 'bait' (CO 96/697/6924; Minuted comment on file devoted to this project). Unfortunately, much of the correspondence dealing with this particular scheme has been destroyed under statute, and the full story cannot be reconstructed; but it appears that a similar proposal to harness the Busimassi rapids was fully considered earlier, around 1920; the scheme was rejected then mainly on financial grounds. Even in the 1930s, the most accessible mine was at Nsuta (manganese deposits), 25 miles from the rapids and the intervening swamp and dense forest would have proved difficult to traverse with cables. Also, the cost of transmission would have been excessive because special tracks would have had to be cut and kept clear to every mine. The gold mining companies themselves were against the project because of the high unit cost of such a source of power, and the Secretary of Mines, writing to the Colonial Office in a confidential despatch, dated 20 January 1932, stated that the Mine Managers'

"... unanimous opinion is that it cannot be done under present conditions, while one manager went as far as to say that in his judgement the whole scheme is nothing but a ramp designed to boost the shares of the North Ashanti Mining Co."

and he concluded that,

"While I am inclined to subscribe to this view privately, it would hardly become me to do so officially, but I may say

that I entirely agree that the scheme is an economic impossibility at the present time" (CO 96/702/7201; Confidential Despatch No.66b/79/1932).

A further objection to this scheme for centralising the power supply of the gold mines at the Busimassi rapids rested on the fact that the total power requirements of the mines, while greater in the 1930s than previously, would be considerably less than the envisaged generating capacity of the Busimassi project; of the total of 95,000,000 units of power envisaged, the mines' needs would barely have reached some 45,000,000 units, and of this the mines of the Tarkwa-Prestea district would not have consumed more than some 24,000,000 units annually. There would have remained, therefore, a surplus capacity of some 50,000,000 units for which no immediate customers could have been found.

In the final analysis, therefore, the mines preferred the alternative of expanding the capacity of their individual power stations to that of drawing their power supply from a central source. However, improvements were made and the old wood-fired boilers were converted to oil-firing. The changeover to oil-fired boilers was to the advantage of the local treasury since an import tax was payable on oil, and at the same time much valuable timber was left intact. An additional benefit of the conversion from wood to oil was that it released labour to work that was more directly productive than wood-cutting. It was not until after the second world war that a degree of centralisation of power supplies was effected when the Ancobra Power Company, which operated a station on behalf of the Bremang Gold Dredging Company, extended its services to the nearby mines on the Prestea range, namely those of Ariston Gold Mines (1929) Ltd. and Gold Coast Main Reef Ltd.

2. Health and Sanitation

The renaissance of gold mining in the 1930s also brought to the fore the necessity of securing a healthy environment on the mine camps in order to reduce the turnover of the labour force. In consultation with the mine managers and other officials of the mining industry, 'Mining Health Areas' were designated in the mid-1930s. Under the accompanying regulations, all the companies were legally required to provide housing and medical facilities for their labour, irrespective of whether that labour was engaged locally or from outside the country. In addition, the legislation provided for measures designed to control the 'aggregations of insanitary hovels' which had gradually grown up in the immediate vicinity of each mining area and to facilitate the relaying of the grossly congested areas in and around such places. Type plans of model dwellings were distributed to all mine managers for their guidance in constructing the housing compounds, and the control of buildings in the towns and villages adjacent to the mining settlements necessitated a clear-out agreement by the Government to undertake the responsibility for the perimeter of these 'mining health areas'.

Although the implementation of these measures was a costly exercise, model villages were laid out to replace the earlier ones built at the beginning of the century, which by the 1930s were totally inadequate both in the number of houses available and in the quality of the amenities provided therein. In addition, by this period, the mining districts had become more than ever points of attraction for population from Ashanti, from the North and from the surrounding French territories, and many of these people settled in parasitic villages on the edge of the mining health areas. This made it very difficult to control the transmission of disease from adjacent areas outwith the

control of the mining companies, but in spite of this hazard, sanitation and living conditions in the mine camps was markedly improved compared to former years. Most of the housing compounds still extant on the mine camps in contemporary Ghana date from this period; subsequent improvements have included the installation of electricity in the compound houses and the provision of a wider range of recreational and related facilities.

Improvements in the living conditions of the expatriate staff were also effected in the 1930s. It was at this period that a West African branch of the Ross Institute was formed, and it carried out an intensive study of the habits of the local species of mosquito with the financial backing of the mining industry. Based on the Institute's recommendations, the mining companies undertook schemes of drainage, bush-clearing and oil-spraying which greatly reduced the number of mosquitos in the mining camps, and so reduced the rate of sickness among staff. As one writer points out, even in the mid-1930s Gold Coast mining companies were,

" ... reluctant to give permission for the wife of an employee to accompany her husband to the mine, largely on account of the poor health and living conditions that obtained there at that time ... It was hardly contemplated that European children could live on the mines" (Allen, 1958, pp.233-4).

To rectify this situation, a programme of building well-designed bungalows for senior staff was implemented. But good housing alone was not sufficient to attract the high calibre of expatriate staff required to run the industry efficiently. Staff contracts also needed revision.

3. Staff Contracts

Even as late as 1935, some five years after the beginning of the renaissance of interest in gold mining in the Gold Coast, the

companies were having difficulty in attracting the top mining engineers into their employment. While the poor health record of the country and the generally unsuccessful nature of the vast majority of the mining enterprises established in the past accounted in part for this situation, the main obstacle was the unattractive nature of the staff agreements. The agreements which obtained until the middle of the 1930s were hardly designed to encourage either stability of employment or to encourage first-class specialists into the industry. In essence, the contracts were for one tour of nine months' service, followed by three months of paid leave, provided that the employee signed a fresh agreement to return for a further tour. The staff contracts were, therefore, anachronistic, the short nine months tour being a hangover from the early pioneering days of modern mining when nine months was about the limit Europeans could bear in the environmental conditions of that time. Thus, one of the most important improvements undertaken in the 1930s was a revision in the terms of staff contracts to bring them in line with modern conditions. Contracts were made continuous, and leave pay was thereafter granted as a reward for past service rather than as a bait to encourage the employee to return. Secondly, tours were extended from 9 to 12 months for underground staff, and from 12 to 15 months for surface employees. The longer tours meant that fewer European staff had to be employed, and savings were also effected in the cost of passages. All these measures provided for a more stable labour force and ensured continuity of management, and in turn the gold resources of the country were more efficiently developed. That production did rise in the 1930s to an unprecedented level can be attributed to the many improvements in the industry's organisation undertaken under the initial stimulus of the increase in the price of gold. But, despite these many improvements, there were also obstacles to progress.

OBSTACLES TO PROGRESS

By the latter half of the 1930s decade the gold mining industry was, technically speaking, better equipped than ever before to prosper and inspire investors' confidence in the industry, and although a substantial amount of fresh capital did flow into gold mining in the Gold Coast, it should be noted that the capitalisation of most of the companies was nevertheless low relative to gold mines in other parts of the world (Williamson, 1934). Possible reasons for this were the failure of most mining ventures and the consequent loss of capital in the earlier period, and the higher potential profitability of the more extensive gold fields elsewhere. In addition, the government had introduced in 1931 a new export tax of 15% on all gold sales. It was considered that the rise in price from 84s to 135s per ounce of gold was a windfall to the producers, and that the companies could therefore comfortably bear this new tax on the gold premium (CO 96/709/1685/2). Notwithstanding these circumstances, it appears that the relatively low capitalisation of gold mining in the country compared to other areas can be attributed to two main causes. First, the circulation of false press reports about gold prospects led to widespread distrust of the industry in the City. Secondly, the renaissance of gold mining in the Gold Coast brought forth the old problem of confusion over concessions and the validity of leases to property, due to the inadequacy of the legislative machinery to deal with the situation.

1. False Press Reports

Much of the initial confidence that investors had gained in gold mining in the country at the beginning of the decade was offset by the circulation of grossly misleading press reports and false

prospectuses. Such developments are not uncommon in the mining industry when boom conditions, such as obtained in Gold Coast mining shares in the 1930s, occur. The number of misleading reports circulating in English financial newspapers was apparently causing concern not only to the bona fide mining companies but also to the Colonial and local authorities, as the following example illustrates. In a confidential despatch, dated 13 March 1935, the Governor wrote,

"I have heard privately from Junner (the then Director of the Geological Survey) that the reports which have been circulated in English financial papers in connection with
 A. Lower Ancobra (Gold Coast) Areas,
 B. Amari (Nigeria) Tin Mines (1931) Ltd.,
 C. Central Wassaw Gold Mines Ltd.
 are all grossly misleading and will tend to deceive the public. It is desirable that 'dud shows' should be nipped in the bud."

Continuing, with a quotation from the prospectus of the Lower Ancobra (Gold Coast) Areas Ltd., the Governor noted that the engineer of that company falsely reported that he had proved the existence of some 11,500,000 cubic yards of alluvium averaging 4s 10 $\frac{1}{2}$ d per cubic yard, on the company's Essuawah concession, ground averaging 11s 3 $\frac{1}{2}$ d per cubic yard. The Governor backed up his assertion with evidence produced by a geologist of the local Survey Department, who wrote in a private note accompanying his geological report on the same area, that,

"... the high-grade gold-bearing alluvium on which the company was floated does not exist and that the reefs do not average more than 2 dwts of gold per ton" (CO 96/722/31072).

The Lower Ancobra company went into liquidation in July 1936.

The solution to this problem came from the Stock Exchange itself, which refused to permit dealings in the shares of companies whose assets consisted of concessions unvalidated by the Concessions Court in the Gold Coast.

2. Concessions Legislation

The second problem which hindered the progress of the industry in the 1930s, the continuing problem of confusion in the Concessions Court with respect to the validity of land titles, is clearly related. There was a new rush for land and mining leases in the Gold Coast following the increase in the price of gold in 1931. This boom in the land market differed from the earlier booms in the 1880s and the early 1900s on two accounts particularly, that the new high price of gold made a more general development of the goldfields worthwhile including relatively low-grade ores, and that as a result of improved local conditions, the location of the gold prospects of the country was more perfectly known. Despite these favourable circumstances, however, steps to expedite the work of the Concessions Court were badly required. The whole procedure needed reviewing to accelerate the legal process of granting validity of title to concessionaires.

The main need was to ensure that a Certificate of Validity, once issued, should be final and unchallengeable, thereby avoiding costly, time-consuming litigation. The then Commissioner of Lands, Mr Stacpole, recommended that the only means of achieving this end was to centralise the records of land transfers in the Lands Department. In a memorandum on the lands question, dated October 1935, he pointed out that the existing situation was still as confused as it had been since the introduction of the Concessions Ordinance in 1900 both as regards overlapping and as regards conflicting interests;

" ... I am aware of concessions leases and options being hawked around London, which, if they could be validated, and there is some chance of this, would defeat some of the validated leases of operating companies" (CO 96/721/31052/2).

The machinery set up by the Concessions Ordinance of 1900 was completely out of date by the 1930s since it made no allowance for developments in

communications. Information about grants of land continued to reach the Lands Department from all directions: from the Colonial Office in London, from the divisional courts, and from registers of concessions filed at Cape Coast, Sekondi, Kumasi and Accra. There was still no co-ordination of the various steps in the validation of concessions at one central point, so that it was impossible for the government to view the current developments as a whole and if necessary take well-advised and timely steps to deal with any aspect of land transactions which was irregular. As a result, enquiries from prospective concessionaires about particular areas took months to answer because there was no indexed quick reference to concessions. Under this chaotic system, mistakes were inevitably made by the Courts, and particulars of concessions which had gained a certificate of validity were often inaccurately published in the Gazette. As Stacpole commented,

"Finality, the aim of the Concessions Ord., can only be achieved when full and accurate information is before the Court" (op.cit.).

As a result of Stacpole's recommendations, and the appreciation of the difficulties in which individuals, companies and the courts found themselves from lack of information, measures were adopted in the latter part of the 1930s to regularise the position. In 1935, a fairly successful attempt to centralise, in the Lands Department, all the records and key maps of extant validated concessions, was made. Secondly, from July 1, 1937, a special Concessions Supplement was published in the government Gazette at monthly intervals. From that date, therefore, it is possible to obtain ready information on all land that was subsequently alienated for industrial and other purposes. This publication was one of the most significant advances made in the 1930s, and subsequent amendments to the concessions legislation, including provisions to stop the costly litigations against concessionaires,

went a long way to restoring investors' confidence in the gold mining industry in the Gold Coast.

CONCLUSION

The revival of interest in gold mining which followed the abandonment of the gold standard by the United Kingdom in 1931 had beneficial results both for the industry itself and for the economy of the Gold Coast. The increase in the price of gold attracted a substantial amount of fresh capital into the industry which allowed not only the intensification of mining and prospecting activity but also permitted a large-scale reconstruction and modernisation within the industry to take place. At the same time, gold increased its share of the export market, and by 1941 gold exports represented over 50% of the total exports, by value, of the Gold Coast (Table 5.2). This is, of course, only partly explained by the expansion of production; the renaissance of gold mining coincided with a slump in the cocoa industry, whose relative contribution to exports fell accordingly. In addition, the gold mines provided employment on an ever-increasing scale, and by 1941, the gold mines' labour force numbered over 35,000. On many accounts, therefore, the gold mining industry played a key role in the economy in the period 1931-1941.

However, notwithstanding these positive achievements, the gold mines still remained to some extent 'economic enclaves' perpetuating the typical colonial pattern of development which characterised most African countries at least until the second world war. Although the gold mining companies were subject to higher rates of taxation in the 1930s than ever before in the history of the industry, the proportion of revenue from mining which stayed in the country was small relative

TABLE 5.2

MEASURES OF THE VALUE OF GOLD MINING
IN THE GOLD COAST ECONOMY, 1931-1941

Year	(i)	(ii)	(iii)	(iv)	(v)
1931	9,300,620	1,069,581	11.0	100,000	7,165
1932	8,348,879	1,236,591	14.8	87,012	8,004
1933	8,048,484	1,841,883	22.8	91,203	8,882
1934	8,117,456	2,421,595	29.8	165,428	10,452
1935	9,971,535	2,635,527	26.4	304,500	15,163
1936	12,636,899	3,047,545	24.1	288,844	23,535
1937	15,949,533	3,910,757	24.5	304,532	27,091
1938	11,079,870	4,841,633	43.7	336,153	27,313
1939	12,747,258	6,177,725	48.4	486,647	30,534
1940	13,478,990	7,207,827	53.4	699,513	33,724
1941	12,833,887	6,850,942	53.3	1,022,334	35,274

- (i) Total domestic exports by value (£ sterling).
(ii) Gold exports by value (£ sterling).
(iii) Gold exports as % of total exports.
(iv) Royalties, export duty, and profits tax (£ sterling).
(v) Labour force (number).

Sources: (i), (ii), (iii): Gold Coast, Annual Export Statistics.

(iv): Junner, 1946, Bull.imp.Inst., 44, 1.

(v): Gold Coast, Chamber of Mines, Annual Reports.

to the profits made and, in some cases, the high dividends paid to the shareholders abroad.

It was not until after the second world war that the local government made attempts to obtain a larger share of the profits from gold mining through higher and more realistic taxation, and secondly, to obtain a larger share of the management through requiring a number of indigenous personnel in the skilled grades, and to improve wages and working conditions in the industry through trade union pressure and labour legislation. These issues are discussed in Chapter 6, in which the post-war developments in the gold mining industry are reviewed, and the history of the industry brought up to 1961.



CHAPTER 6

THE HISTORICAL PERSPECTIVE:
1942-1961 : THE POST-WAR CRISISINTRODUCTION

As was shown in Chapter 5, the 1930s was a period of modernisation for the gold mining industry in the Gold Coast. By the end of the decade, modern shafts had been completed, new mills had been put into operation, living conditions on the mine camps had been vastly improved, and the legal framework with respect to land grants had been regularised. The response of the industry to these improvements was clearly seen in the rapid rise of gold production, which trebled over the decade. But, this progress was not destined to continue, since the outbreak of the second world war placed a severe brake on gold mining operations. The impact of the interruption of full operations during the period of the war, and the post-war effects of this interruption are the subject of this chapter.

The interruption of gold mining operations during the second world war had a profound effect on both the geographical distribution of gold mining, and its profitability in the post-war years. Production did not cease in 1939, and the industry was allowed to continue in production, within the limitations of obtaining supplies under wartime restrictions, until the end of 1942. In that year, the Colonial Office issued instructions that, owing to the wartime necessity of conserving fuel oil and tanker space, all but four of the gold mines were to close immediately. The industry replied that, in the light of the importance of gold, and the possibility that once closed many of the mines would be unable to afford to reopen later, an effort should

be made to keep them all open. A plan was worked out to this effect, and details drawn up of ways in which the industry could reduce its fuel oil consumption by some 10,000 tons. After negotiations between the companies and the Colonial Office, it was decided that all but four of the mines should be kept open; the four mines to be kept on a 'care and maintenance' basis were Marlu, Amalgamated Banket Areas, Gold Coast Banket Areas, and South Banket Areas. Those left in production paid for the cost of keeping these four on a 'care and maintenance' basis, by paying a levy which amounted to £587,006 (Gold Coast Chamber of Mines, 1950, p.24). As a result, gold production did not decline immediately with the advent of the second world war, and for the year 1940-41, the year before the concentration scheme came into effect, a record output of 882,241 ounces was attained. Both output and employment in the industry declined thereafter; output from 880,000 to 527,628 ounces from 1942 to 1945, and employment from 35,274 in 1941 to 24,589 in 1945.

POST-WAR PROBLEMS

The problems which faced the industry on its full resumption in 1946 can be summed up in one word, inflation. Inflation affected all items of working costs, and in particular the component of labour cost, which comprises 50% to 60% of total working expenditure, rose inexorably. The industry reacted in two ways to the inflation in costs which intensified in the post-war years. First, the industry contracted spatially with the closure of several mines. Secondly, the surviving companies had no alternative but to increase the scale of their operations to achieve economies. Thus, by 1961 there were only 7 mines open compared to a total of 16 active mines in the pre-war

decade. Nevertheless, although the industry contracted spatially in the post-war period, production never fell below 500,000 ounces of gold, as a result of the increased scale of operations adopted by the surviving mines. In this context, it is important to note, however, that it was not until 1960-61 that the industry attained an output comparable to the 1940-41 record of 882,241 ounces; the 1960-61 production of 915,317 ounces of gold represents, in fact, the highest annual output ever achieved in the history of commercial mining. Employment statistics for the period 1941-1961 reflect more emphatically the spatial contraction of the industry after the second world war; employment in gold mining declined by some 15,000, from over 35,000 in 1940-41 to under 20,000 in 1960-61.

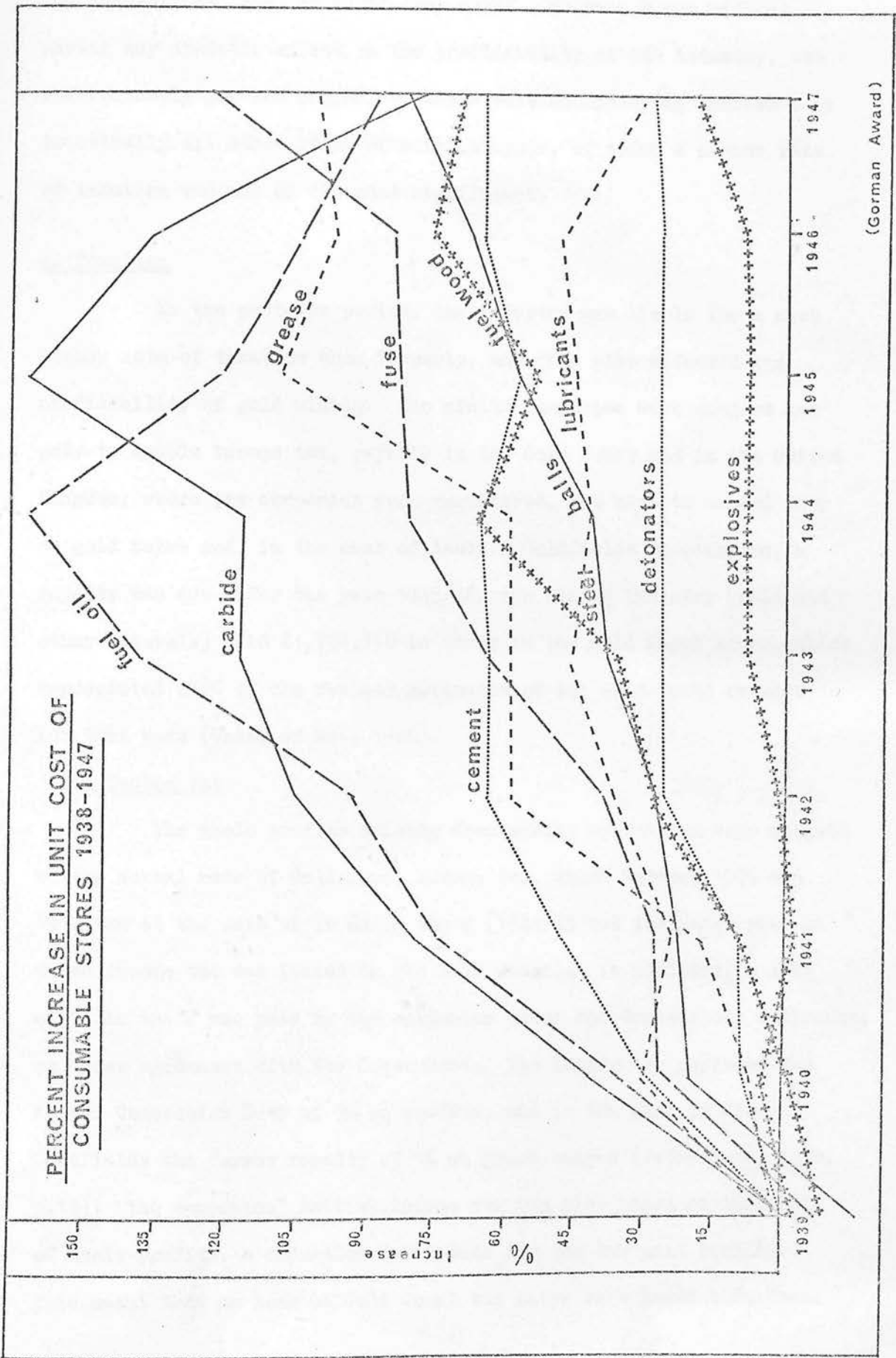
The performance of the gold mining industry in Ghana since the second world war accords, in fact, with the world-wide trend in the industry. All gold producers have found themselves caught between rising production costs and a relatively stable selling price for gold. With the re-establishment of bullion markets in London and other centres in the mid-1950s, prices obtained on the free market for gold were never high enough to attract new capital into the industry, nor to prevent the closure of marginal mines. It should be recalled that gold reacts in an opposite direction to other metals in times of prosperity, especially if accompanied by inflation such as has been characteristic of the post-war era; supply contracts rather than increases under such conditions. This is precisely what has happened in the world gold mining industry since the second world war. In spite of the insatiable demand for gold to meet international trading debts, and the ever-widening industrial market for the metal, the gold mining industry has contracted spatially, in Ghana and elsewhere.

In Ghana, a large number of problems emerged in 1946, the year in which the industry set about restoring production to its former level. These difficulties were varied in origin, but all worked in the same direction to squeeze profit margins: stores showed large price increases from the pre-war level; taxation was higher; labour supply was both inadequate and more difficult to secure with the growing competition in the labour market; and labour costs continued to rise while labour productivity fell. In essence, production costs escalated while the selling price of gold showed but a slight increase over the pre-war level.

1. Stores

The industry faced a formidable task in 1946 to restore production to its former level. The four mines which had been on a 'care and maintenance' basis from 1943 faced the inevitable delays in bringing their mines back into full operation, and the entire industry faced the inevitable delays in the delivery of supplies and new equipment. But, a factor of greater importance in affecting the resumption of full production was the new post-war prices for stores; all the main items of consumable stores showed considerable price increases in 1946 over the 1939 level. These increases were in the range of 15% to 131% (Fig.6.1). For example, cyanide, the chemical used in the separation of gold, cost £71 16s 2d per ton in 1946, compared to the 1939 price of £60 18s 4d; carbide had risen in price from £13 7s 10d per ton to £24 7s 9d; steel balls, used in grinding, had more than doubled in price from £14 10s 1d per ton in 1939 to £33 9s 2d by 1946; and gas oil showed a 121% price increase in 1946 over the 1939 level. Had these been the only cost increases facing

PERCENT INCREASE IN UNIT COST OF
CONSUMABLE STORES 1938-1947



(Gorman Award)

FIG 6-1

the industry in 1946, no doubt they could have been borne without having any dramatic effect on the profitability of the industry, but unfortunately for the companies, there were accompanying increases in practically all other items of working costs, of which a higher rate of taxation was one of the most significant.

2. Taxation

In the post-war period, the industry was liable for a much higher rate of taxation than formerly, and this also affected the profitability of gold mining. The mining companies were subject not only to double income tax, payable in the Gold Coast and in the United Kingdom, where the companies were registered, but also to export duty on gold sales and, in the case of Ashanti Goldfields Corporation, a royalty was due. For the year 1945/46, the mining industry (gold and other minerals) paid £1,751,110 in taxes in the Gold Coast alone, which represented 27 $\frac{1}{2}$ % of the revised estimates of the Gold Coast revenue for that year (Chamb.of Ms., 1946).

(i) Income tax

The whole profits arising from mining operations were subject to the normal rate of Gold Coast income tax, which between 1945 and 1952 was at the rate of 7s 6d in the £ (1944/45 was the first year in which income tax was levied in the Gold Coast). In addition, a levy of 1s in the £ was paid by the companies under the Concessions Ordinance, or under agreement with the Government. The latter tax replaced the former Concession Duty of 5% on profits, and in the case of Ashanti Goldfields the former royalty of 5% on gross output (Sutherland, 1950, p.12). The companies' British income tax was also based on the whole of their profits, a deduction being made for the tax paid locally. This meant that as long as Gold Coast tax rates were lower than those

obtaining in the United Kingdom, the Gold Coast government could not help the companies by tax reliefs, for if their local tax was reduced, the tax payable in the United Kingdom was increased by a like amount. The total burden of taxation by 1947 amounted to 12s 10½d in the £, made up as shown in Table 6.1

TABLE 6.1

DISTRIBUTION OF TAXES : AMOUNT/£

<u>In Gold Coast</u>	
Income tax	7s 6d
Profits tax	1s 0d
<u>In United Kingdom</u>	
Income tax*	1s 10½d
Profits tax	2s 6d
	<u>12s 10½d</u>

* less reciprocal relief.

In 1946, twelve mines were equipped for production, and of those only seven were earning profits (Table 6.2). The high rates of taxation were considered inimical to the attraction of fresh capital into the gold mining industry because of the low return which could be expected under such conditions (Gorman Award, 1947, Exhibit K).

(ii) Export duty

While the income tax rates were high in the post-war era, the additional high export duty was perhaps of even greater significance in affecting the profitability of gold mining. The principle of the gold duty was itself in question, since it represented a tax on output rather than earnings, thereby taking no account of operating costs. From 1924 to 1939, gold was subject to an export duty of 15% of the gold 'premium', being defined as the difference between the given price

TABLE 6.2

SUMMARISED PROFIT AND LOSS ACCOUNTS FOR 1945-46

Company	(i)	(ii)	(iii)	(iv)
	£	£	£	£
Amalgamated Bantet Areas	-	-	-	-
Ariston Gold Mines Ltd.	664,705	365,162	457,327	207,378P
Ashanti-Adowsena Goldfields, Ltd.	-	-	-	-
Ashanti Goldfields Corp., Ltd.	1,744,449	830,046	1,019,931	725,118P
Bibiani (1927) Ltd.	669,930	420,994	507,603	162,327P
Bremang Gold Dredging Co.	159,136	110,058	144,975	14,161P
Gold Coast Bantet Areas	-	-	-	-
Gold Coast Main Reef Ltd.	348,726	178,261	251,727	96,999P
Konongo Gold Mines	435,620	269,610	338,699	96,921P
Marlu Gold Mining Areas	66,304	97,042	98,490	32,186L
South Bantet Areas	-	-	-	-
Taquah & Abosso Mines	621,182	425,629	534,809	86,373P
TOTALS	£4,710,052	£2,696,802	£3,352,961	£1,357,091

(i) Total revenue (bullion sales, and sundry revenue).

(ii) Working costs.

(iii) Total charges (ii, depreciation and development costs).

(iv) Profit (P) or Loss (L).

- = Mines not at the producing stage, but ready to begin production.

Source: Gorman Award, 1947, Exhibit N.

of gold, which in 1947 was 172s 3d per ounce, and the old par value of 84s 11½d per ounce. In 1946, this was raised to 20%. During the second world war, an Order in Council made by the Governor came into force on 12 December 1939, amending the table of export duties. The rate of duty payable on gold was altered to,

"15 per centum of the first 65s 0½d of the gold premium, plus a war surtax of 50 per centum of that part of the gold premium in excess of 65s 0½d" (Chamb. of Ms., 1940, p.16).

This was stressed as purely a wartime measure, and in 1946 the Government announced the removal of the surtax, but an increase in the export duty from 15% to 20%. This meant that in 1947, with the price of gold at 172s 3d per ounce, the duty payable was 20% x (172s 3d minus 84s 11½d) or 17s 5½d per ounce. This new rate of duty was a particularly heavy burden for the low-profit mines, which had previously paid only 11s 7½d per ounce in export duty. To make matters worse, the increased export duty was accompanied by an amendment in the Customs Tariff regulations which also worked against the low-profit companies. Section 2 of Regulation No.11 of 1946, made under Section 13 of the Customs Tariff Ordinance (Cap.133) had repealed the Customs Tariff Regulation No.17 of 1939. The latter regulation had allowed any mining company a rebate on export duty if that company could prove that it would have incurred a loss had gold been sold at the old par value of 84s 11½d per ounce. The amending regulation of 1946, however, withdrew this rebate, and the low-grade marginal mines were thereby adversely affected. The local Chamber of Mines took up this issue with the Government, stating that,

"The whole principle of a levy on the price of gold is unscientific and creates an excessive burden on the industry particularly the low-grade mines" (Chamb. of Ms., 1946, p.16).

After making representation to the Government along these lines, it was

agreed that the revoked 1939 regulation should be enacted and made retrospective to 1 April 1946. However, notwithstanding this concession, the fact that the 20% gold duty was retained gave continuing cause for concern from the marginal mines; in 1947, taxation represented some 10% of the value of gold produced. The President of the Chamber of Mines expressed, in the Annual Report of the Chamber for 1947, his disappointment

" ... at the lack of grasp shown by the authorities of the true position of affairs with the continually rising costs in the purchase of stores and equipment as well as of labour"
(Chamb. of Ms., 1947, p.16).

The export duty on gold therefore remained at 20% of the premium, subject to a refund of 15% of the loss that would have been incurred had the selling price been 84s 11½d per ounce. The net rate, therefore, varied from nil, where there was a trading loss of 39s 2d per ounce, to 4s 4d, where no profit or loss was made, and so increased to the full 17s 5½d when the ratio of profit to output exceeded 51%. The two main objections to this system were that it converted any small profit by a low-grade mine into a loss, and that, expressed as a percentage of profits, it was a retrogressive tax, diminishing steeply as the profitability of the mine increased (Sutherland, 1950, p.12).

From October 1, 1948, the Gold Export Duty was replaced by a Gold Duty, charged on all gold won at a rate varying with the profitability of the mine, i.e. the ratio of its profit to the value of its output. In other words, the burden of taxation was shifted from the lower-grade mines to the higher-grade mines, a more realistic situation. The new duty was expressed in shillings and pence and not ad valorem, and so it remained unaltered after 1949 despite the increase in the price of gold obtained in that year as the result of the devaluation of the pound sterling. This new duty gave some relief to

the low-grade mines. However, in 1951, further reforms in the taxation laws were made which further increased the economic strain on the marginal mines. Under the Minerals Ordinance of 1952, the Gold Duty was replaced by a Minerals Duty, which applied to all the minerals exported; its calculation was based on the same principle as had applied to its predecessor, based on the ratio of profits to production. However, under the Income Tax (Amendment) Ordinance of 1952, income tax was raised from the former level of 7s 6d in the £ sterling to 9s. While, in the case of the mining industry, this new rate absorbed the old levy of 1s in the £ for profits tax, the end result was still an increase in the local tax payable. In addition, under the Local Government Ordinance of 1951, the mining companies were thereafter liable to pay rates on their land concessions. Consequently, in spite of the increase in the selling price of gold from 172s 3d to 248s per ounce, following the 1949 devaluation of sterling, the economic position of the low-grade gold mines in particular became increasingly worse throughout the 1950s. Stores continued to rise in price, and taxes equally rose inexorably thereby squeezing the profit margins of the gold mining companies.

3. Labour Supply

A third problem which faced the gold mining industry in the post-war years was the increasing difficulty of obtaining and retaining an adequate supply of labour. The competition in the labour market, which had begun to prove a problem for the gold mining industry in the 1930s, intensified in the post-war years. It was not until 1950 that the mining industry was allowed to establish a formal recruiting system in order to regularise its supply of labour. A base was set up in the Northern Territories, at Bolgatanga, the most convenient centre to tap

the stream of migrants from the north of the country and over the border from Upper Volta, moving south in search of employment.

Prior to 1950, migrants reached the south by a system of illegal recruitment, described by an official of the mining industry as "wholesale slave trading" operated by "collectors". There were a number of "collectors" licenced under the local authority to collect cargo for lorries plying between Bolgatanga and Kumasi; these collectors regularly collected "human cargo" at the same time (Mines Labour Enquiry, 1953, p.6). The men were then transported free of charge from the border to Bolgatanga, and thence to Kumasi. Since the fare from the border to Bolgatanga was 2s per head, the collector would "sell" his load of "human cargo" to another collector for 2s 6d per head. The second collector would then transport the men, again free of charge, to Kumasi, where he would "sell" his "load" for 25s per head, thereby making a profit of 5s per head on the ride. In this way, groups of labourers were "sold" to cocoa farmers in the south, and eventually many of the men would find their way to the mines, once the cocoa season was over. Contrary to prevailing ideas, therefore, these migrants from the north did not walk long distances to arrive in the south exhausted and unfit for work; they were brought south by lorry, free of charge, under this intricate but illegal recruiting scheme organised by the local collectors. This was the type of local organisation with which the official recruiting plan, established in 1950, had to compete.

A Mines Transit Welfare Centre was established at Bolgatanga in 1950, headed by a certain Colonel Gilbert, who was the only person authorised to recruit labour on an official basis. Bolgatanga was chosen as the most suitable point for the labour agency, since it lies at the junction of two major roads in the North; one arm goes east to

Bawku, Mongonori and Pusiga in Upper Volta, the other arm westward to Navrongo and Po through Faga. Bolgatanga therefore commanded a wide 'catchment' area for migrants entering Ghana in search of employment.

This agency was originally sponsored on behalf of the mines of the Finsbury Pavement House group, comprising Amalgamated Banket Areas, Marlu, Gold Coast Main Reef and the Bremang Gold Dredging Company, but other mining companies later joined. All the mining companies had from time to time attempted to make up their deficit labour by organising on an 'ad hoc' basis the transport of workers from various points in the North, but the Government ruled such methods illegal, under the Labour Ordinance of 1948. Indeed, it was with reluctance that the mines were given the authority to set up their recruiting agency, and the scheme was sanctioned by the Government on the understanding that the men so engaged had voluntarily and spontaneously offered themselves for employment. The Recruiting Licence issued to Colonel Gilbert, by the Commissioner of Labour, was also accompanied by strict conditions to ensure that no man was forced into the employment of the mines if he preferred alternative work.

The main features of the licence were as follows:

- A) that not more than 2000 labourers should be recruited under the Licence before 31st December in any one year for which the Licence was issued.
- B) that recruiting operations should be confined to the districts of Mamprusi and Wa.
- C) that any labourer recruited and brought to the mines from a distant place and then rejected as unsuitable should be given free transport back to his place of recruitment.
- D) that all labourers under the scheme should be given the opportunity to obtain a Certificate of Registration issued by the Labour Department at Bolgatanga, Kumasi, or any other station, before his engagement by the mines recruiting organisation.

The scheme was, however, a failure, for many reasons, and was abandoned

after two years. The Chiefs were reluctant to encourage the emigration of labour on such a large scale because of the loss to the Native Authorities' Treasuries which resulted. Secondly, the Chiefs also complained that the workers returned from the south destitute and penniless, having spent all their wages on "riotous living" (Mines Labour Enquiry, 1953, p.7). It was also unsatisfactory from the mining companies' point of view, since,

"Many recruits, it is understood, merely take advantage of the free transport to get them to the mining districts and then, after varying periods of service mostly short abscond. It is estimated that the average period they remain at work is 75 days" (Mines Labour Enquiry, 1953, p.6).

The main difficulty, however, lay in the inability of Gilbert's agency to undercut the illegal but highly organised "collectors" organisation. Certainly, there was no lack of migrants moving southward, as is shown in records of the volume of labour crossing the ferries in the North (Table 6.3). The problem of obtaining a regular flow of labour therefore remained with the mining industry, and no formal recruiting system has subsequently evolved. Currently, the companies rely on men presenting themselves to the local Labour Offices, to which the companies forward details of the number and type of positions that are vacant.

4. Labour Costs

While labour shortages in the gold mining industry had some effect on the rundown of the industry in the post-war era, it was essentially the related issue of rising labour costs which proved the greater economic constraint on the profitability of gold mining after the second world war. Indeed, it is possible to say that of all the problems experienced by the industry after full operations were resumed in 1946, the continuing rise in labour costs was the most important

TABLE 6.3

LABOUR CROSSING THE FERRIES IN THE NORTHERN TERRITORIES
(SELECTED YEARS)

FERRY	NORTHWARD		SOUTHWARD	
	British	French	British	French
<u>1943-44</u>				
Yeji	34,532	43,462	38,425	54,711
Bamboi	9,898	9,227	9,525	9,279
Buipe	128	155	264	1,243
Krachi	88	147	99	277
Akroso	1,599	5,753	1,759	8,547
TOTALS	46,205	58,744	50,072	74,057
<u>1945-46</u>				
Yeji	42,546	30,089	40,864	28,806
Bamboi	13,757	5,797	13,469	10,942
Buipe	278	328	111	913
Krachi	35	152	50	268
Akroso	7,809	5,517	7,531	5,741
TOTALS	64,425	41,883	62,025	46,670
<u>1948-49</u>				
Yeji	73,043	38,398	81,509	46,848
Bamboi	34,269	21,090	29,717	23,961
Buipe	69	390	41	679
Krachi	156	2,236	138	395
Akroso	16,539	14,489	16,417	14,862
TOTALS	124,076	76,603	127,822	86,745

Source: by permission of Bibiani Goldfields, Labour files.

single factor leading to the post-war decline and contraction of gold mining in Ghana. In 1945, the Mines Employees Union was created and from that time, labour relations in the industry deteriorated, disputes and strikes became frequent, and demands for wage increases mounted. The number and the magnitude of the wage increases granted between 1945 and 1961 contributed not only directly to the diminishing profit margins of the gold mining companies, but also indirectly to the spatial contraction of the industry.

The first serious wages dispute occurred in 1947, at a time when the industry was struggling to recover from the wartime backlog of development work in face of higher prices for stores and equipment. The newly-inaugurated Mines Employees Union sent a petition to the Chamber of Mines, listing several claims in respect to the conditions of employment on the mines (Appendix VII). Since its foundation in 1928, the Chamber of Mines acted as an intermediary body between the mines' labour force and the relevant Government departments, on all matters relating to the social and economic welfare of the mining industry. With the creation of the Union, the only change in these arrangements was that the unofficial representatives of the mines' labour force were replaced by officials of the Mines Employees Union. It was therefore under the new arrangements that the Union petitioned the Chamber in 1946 in respect of certain conditions of employment on the mines, but the Chamber replied that they were unable to concede to all the demands listed by the Union, although they were prepared to consider wage claims in respect of the lowest paid workers. As such, the Chamber submitted a schedule of wage rates to raise the minimum daily rate for underground and surface workers to 2s 6d and 2s respectively, the levels requested by the Union. These increases alone

were estimated to cost the gold mining industry an additional £150,000 per annum. Individually this meant, taking Amalgamated Basket Areas as an example,

"... that these concessions will cost, with the present staff 1500 a month extra - roughly equivalent to 200 ounces of gold extra, or 1500 tons of ore extra to be produced, or mining $1\frac{1}{2}$ tons a month extra by each man" (Gorman Award, 1947, Exhibit C).

In other words, for some of the low-grade mines, as the above-mentioned company, the increases offered to the Union by the Chamber meant that they would have some difficulty in bearing the extra costs.

The Union refused the offer, and intimated that a strike would take place on 29 September 1947. The strike lasted four weeks, and meanwhile the issue was referred to arbitration. The issues facing the Arbitrator, William Gorman, were of greater significance than the mere settlement of a wages claim; the entire future of the gold mining industry was at stake. This was made clear in the report of the Arbitrator (briefly referred to as the Gorman Award), which stated,

"Any award, such as was asked for, would mean the end of the Basket mines and some of the other mines" (Gorman Award, 1947, p.14).

From all the evidence produced at the enquiry, it was apparent that the industry could not bear the wage increases unless the selling price of gold improved, the burden of taxation was lessened, or the output of the mines rose substantially. A compromise was required if the industry was not to disintegrate. The selling price of gold had shown a mere 14% increase between 1938 and 1947, from 150s to 172s 3d per ounce (Table 6.4), while working costs had risen in the range 25% to 73% from mine to mine between 1940 and 1947 (Table 6.5). In 1940, the companies had to pay out approximately 65% of the value of gold produced by way of disbursements on stores, wages, welfare facilities and other items of a recurrent nature; by 1947, this proportion had

TABLE 6.4

PRICE OF GOLD : CHANGES 1938-1947

Year	Price (shillings/oz)	% Increase (over 1938)
1938	150.00	0
1939	156.00	4
1940	168.00	12
1941	168.00	12
1942	168.00	12
1943	168.00	12
1944	168.00	12
1945	170.48	13.65
1946	172.25	14.83
1947	172.25	14.83

Source: Gorman Award, 1947, Exhibit L.

TABLE 6.5

COST PER TON MILLED (SHILLINGS) : 1940 and 1947
(SELECTED MINES)

Company	1940	1947	% Increase
Ariston	26.4	33.0	25.0
Ashanti	35.3	61.3	73.7
Bibiani	19.7	26.0	31.9
Konongo	31.0	47.8	54.2
Taquah & Abosso	21.5	29.2	35.8

Source: Gorman Award, 1947, Exhibit O.

TABLE 6.6

DISBURSEMENTS BY GOLD MINING COMPANIES
(SELECTED YEARS)

	1940		1944		1947	
	£	%	£	%	£	%
<u>REVENUE</u>						
Value of gold produced	6,587,504	100	4,508,507	100	5,202,056	100
<u>DISBURSEMENTS</u>						
(i)	851,028	12.9	651,734	14.4	711,159	13.6
(ii)	1,624,858	24.6	1,276,032	28.3	1,891,182	36.3
(iii)	381,645	5.7	463,771	10.3	714,936	13.7
(iv)	1,361,123	20.6	547,860	12.2	1,241,987	23.8
(v)	68,844	1.0	63,664	1.4	100,424	1.9
	4,287,498	64.8	3,003,061	66.6	4,659,688	89.3

(i) Government: Export duty, Customs duties, Rail and Harbour dues, Posts and Telegraphs (BUT EXCLUDING Income Tax and Profits Tax).

(ii) Wages and Salaries.

(iii) Stores purchased locally.

(iv) Stores imported.

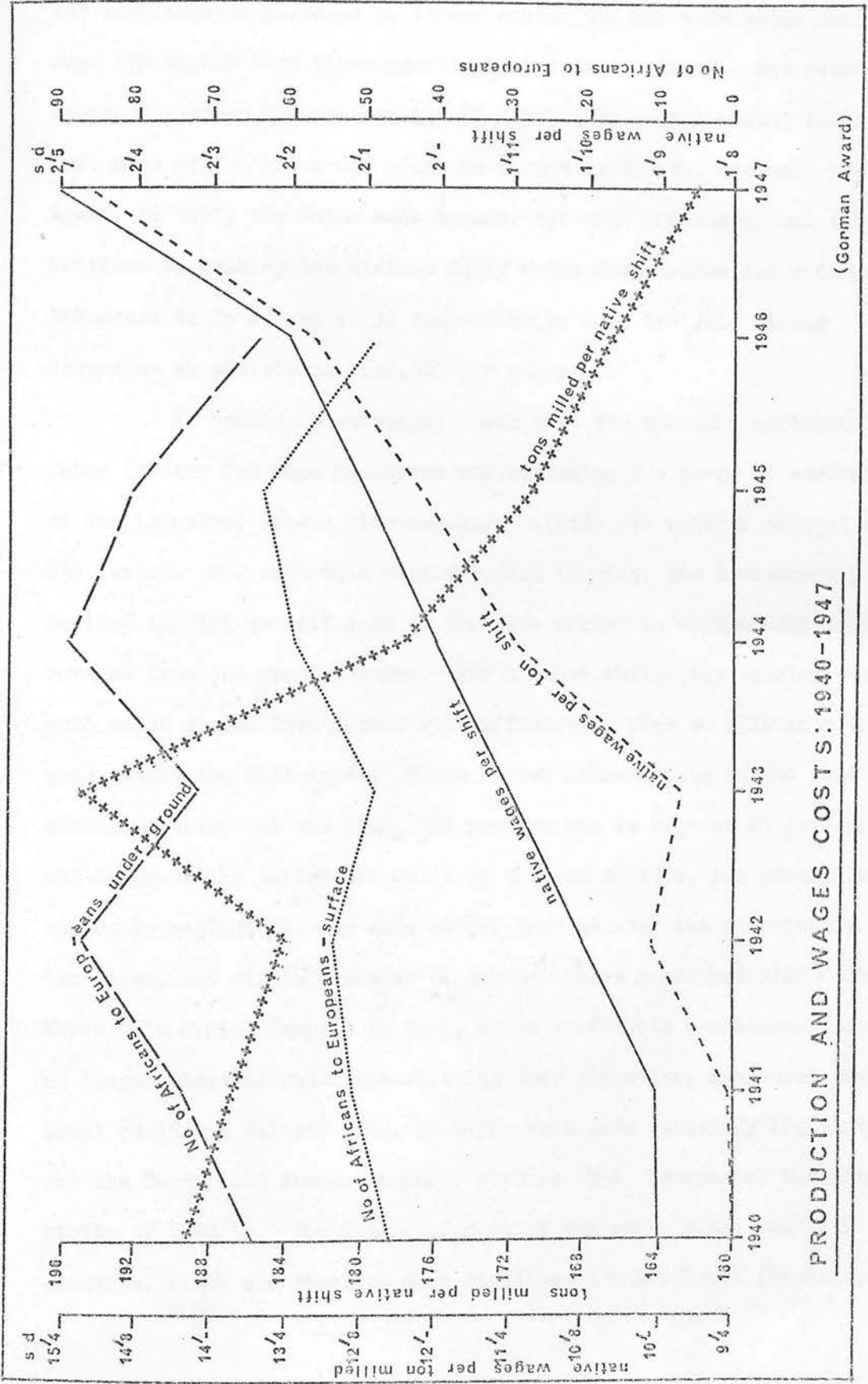
(v) Medical and sanitation.

Source: Gorman Award, 1947, Exhibit W.

risen to nearly 90% (Table 6.6). At the same time, labour productivity had declined while wages had increased (Fig.6.2).

It was in the light of these circumstances that the Gorman Award was made, and it was made retrospective to 1 April 1947. The effect of the award, in respect to the schedule of wages laid down therein, was to place some of the mines immediately into the category of marginal enterprises, although none actually closed. However, in order to survive, several of the companies working the low-grade banket deposits on the Tarkwa goldfield were forced to amalgamate; Amalgamated Banket Areas acquired the mines of Gold Coast Banket Areas, and South Banket Areas, in 1949, which gave that company large enough ore reserves to permit economies of scale. Secondly, the implementation of the Gorman Award wage rates meant a further delay in the completion of the long-term schemes which had been in hand before the outbreak of the second world war. Ore reserves development had been sacrificed during the war, and the companies were struggling to get back into the position as from 1939. It was estimated that the capital cost of the work in progress in 1947 amounted to some £4,000,000, and that a considerable amount of fresh capital would be required to bring the long-term plans into fruition (Gorman Award, Exhibit R). The effect of the Gorman Award had been to set these plans back yet again.

Despite the fact that the Gorman report had stressed that the gold mining industry could not be expected to bear further wage increases if it were to survive as a profit-making industry, demands for wage increases became endemic throughout the 1950s. The next wage increase came in late 1949, following a general increase awarded in the Civil Service because of the rising cost of living in the country.



PRODUCTION AND WAGES COSTS: 1940-1947

(Gorman Award)

FIG 6.2

Sterling had been devalued in 1949, which meant that the selling price of gold rose. However, this increase in revenue was cancelled out by the simultaneous increase in labour costs; the new wage rates were some 17% higher than those granted by the Gorman Award. One year later, a further 5% increase in the wage rates in the mining industry left some of the low-grade mines in an extremely weak economic position. Again, in 1952, the Union made demands for wage increases, and the settlement, raising the minimum daily rates for surface and underground labourers to 3s 6d and 4s 3d respectively, cost the gold mining companies an additional £636,000 per annum.

It became increasingly clear that the constant agitation by Union leaders for wage increases was weakening the power of survival of the industry, unless circumstances outside its control changed in its favour. So, with this consideration in mind, the Government decided in 1952 to sell gold on the free market to obtain additional revenue from the premium price. For a short while, the premium from gold sales on the free market was sufficiently high to alleviate to some extent the full impact of the higher labour costs in the gold mining industry; at one time, the premium was as high as £1 per ounce, but it gradually tailed off until by the end of 1954, the premium was virtually negligible. By this stage, the industry was practically on its knees, and within a matter of months, three mines had closed down; Marlu Gold Mining Company in 1955, since profitable operations were no longer possible under the existing cost structure; Lyndhurst Deep Level (Gold and Silver) Ltd., in 1956, went into voluntary liquidation; and the Taquah and Abosso company, also in 1956, because of the prolonged strike of 1955/56. The future of most of the other mines was also in question, since ore reserves were standing at a low level (Table 6.7).

TABLE 6.7

GOLD MINING COMPANIES : ORE RESERVES AT 1954-55

Company	(i)	(ii)	(iii)
Amalgamated Banket Areas	1,406,160*	284,346	4.5
	1,238,240**	373,111	3.0
Ariston Gold Mines (1929) Ltd.	2,156,003	425,745	5.0
Gold Coast Main Reef Ltd.	254,437	103,614	2.5
Ashanti Goldfields Corp., Ltd.	2,021,674	189,749	11.0
Bibiani (1927) Ltd.	1,481,048	249,198	5.5
Konongo Gold Mines Ltd.	197,470	33,675	6.0

(i) Available ore reserves (tons).

(ii) Current rate of depletion (tons per annum).

(iii) Number of years for which developed ore is available.

* underground sources.

** surface sources.

Source: 1956 Board of Enquiry, Table I, p.21.

Production for the year 1955/56, at 562,445 ounces, was the lowest on record since 1947/48.

The circumstances surrounding the closure of Taquah and Abosso, the oldest mine in the country, dating from 1878, have been described as,

"... one of the most irresponsible acts ever committed by a Trade Union" (Chamb. of Ms., 1956, p.17).

The Mines Employees Union had put forward yet another demand for wage increases in 1955, and called a strike in support of their claims. Meanwhile, the Government appointed a Board of Enquiry to look into the validity of the claims, but the strike continued to last a full three months, from November 1955 to February 1956. The unnecessary continuation of the strike after the official Board of Enquiry had been appointed in December 1955 was the direct cause of the closing of Taquah and Abosso. The management of the company had approached the Government in May 1955 for a loan to extend its development programme, but the Government refused; the company had borrowed £25,000 in November 1953 from the Government. In spite of the refusal for further Government assistance in May 1955, the mine continued to function, since it had ore reserves stoped out for a further two years of active mining. However, the cost of keeping the mine in working condition during the strike in the latter part of 1955 exhausted the company's available capital funds. It has been estimated that the cost of pumping water out of the shafts and maintaining the other necessary services during the strike averaged £5,500 per week. In January 1956, therefore, the company approached the Government for an emergency loan to keep the mine in working order until the strike finished, but the request was refused. As a result, on 17 January 1956, with no capital left, Taquah and Abosso closed down. Throughout the duration of the strike, the

Union adamantly refused to permit the minimum numbers of men, necessary for the safety of the mines, to continue at work (see Appendix VIII), and,

"... had it not been for the loyalty and willingness of the European staff in maintaining the essential services, every deep-level mine in the country might have been lost through flooding" (Chamb. of Ms., 1956, p.17).

The Taquah and Aboosso company closed down, leaving to be flooded one year's supply of ore, valued at nearly £1,000,000, ready stoped out for mining. At the same time, some 3000 African employees of the company were put out of work as a result of its closure, and the piped water and electricity supplied by the mine to the town of Aboosso were cut off (Board of Enquiry, 1956, p.51).

In March 1956, the Government announced a temporary increase of 15% in the wages of daily-rated labourers and a smaller increase for the higher paid labour, to take effect from 1 April 1956, pending the findings of the Board of Enquiry. The Board reported in June 1956, and it was made clear that the proposed increases could not be borne by many of the companies unless they were given public assistance. The Board recommended,

"... Government aid over a short-term period if wage adjustments have to be met" (Board of Enquiry, 1956, p.53).

The survival of the industry depended on the reaction of the Government to that recommendation, since by that time all the companies showed dwindling profit margins (Table 6.8). The future of the industry lay with the politicians.

TABLE 6.8

SUMMARY OF GOLD MINING COMPANIES* PROFITS : 1948-1955

Year	(i)	(ii)	(iii)	(iv)	(v)
	£	£	£	%	s d
1948-49	13,484,724	940,767	485,380	3.6	172. 3
1949-50	12,804,190	1,371,148	898,903	7.0	203 9
1950-51	14,397,137	2,493,900	1,474,471	10.2	248 -
1951-52	14,461,119	2,149,623	1,036,146	7.2	251 3
1952-53	14,450,985	1,894,389	899,703	6.2	264 10
1953-54	14,476,907	1,897,538	918,081	6.3	256 3
1954-55	13,878,603	1,697,608	730,872	5.3	250 2

- (i) Capital employed.
(ii) Net profit before tax.
(iii) Net profit after tax.
(iv) % net profit to capital employed.
(v) Average price of gold.

* The Companies are:

Amalgamated Banket Areas, Ltd.
Taquah & Abosso Mines, Ltd.
Ariston Gold Mines (1929) Ltd.
Ashanti Goldfields Corporation, Ltd.
Bibiani (1927) Ltd.
Gold Coast Main Reef, Ltd.
Konongo Gold Mines, Ltd.
Lyndhurst Deep Level (Gold & Silver) Ltd.
Bremang Gold Dredging Co., Ltd.

Source: 1956 Board of Enquiry, Statement VII, p.92.

GOVERNMENT INTERVENTION

The Government could not afford a repetition of the Taquah and Aboisso episode, and so a programme of grants and interest-free loans was worked out to help the low-grade marginal mines continue in operation. The motives for the aid programme were clearly spelled out in socio-economic terms by the President, who, in a speech in the Legislative Assembly in August 1956, stated that the closure of the four marginal mines in question (Bibiani, Amalgamated Banket Areas, Gold Coast Main Reef, and Bremang Gold Dredging Company) would mean a direct loss of some 11,000 jobs and the loss of export earnings of over £3,000,000 per annum, as well as an indirect loss of the livelihood of the traders and transport workers and others, who depended on the market provided by the mines. In these terms, the President stated that the Government,

" ... would be prepared to give some measure of financial assistance to enable the mines to keep open" (Gold Coast Legislative Assembly Debates, 1956, p.490).

It was this decision, therefore, that prevented a further spatial contraction of the gold mining industry.

In the first instance, the Government offered the mines loans for specific development programmes, but this was rejected by the industry in favour of the revised offer of grants, totalling £200,000 to be shared by the four marginal mines. These grants were to be spread over two years, from mid-1956, and they were designed specifically to enable these companies to pay the wage increases awarded on the settlement of the three-month strike. It was envisaged that a short-term programme of this nature would be sufficient to alleviate the full impact of the new wage rates, while allowing the mines to work out plans for increasing the scale of production to a

level at which they could continue operating unaided when the grant period came to an end. Then came Independence on March 6, 1957.

GOVERNMENT POLICY AFTER INDEPENDENCE

In 1957, the first objectives of the newly independent Government in the economic sphere were to ensure that output and employment in established enterprises were maintained. In this respect, the attitude of the new government towards private foreign enterprise engaged in key sectors of the economy was vital to the gold mining industry. It has been shown that by Independence the gold mining industry had become a problem industry, and that its survival depended on financial assistance from the local Treasury. Without continuing government support, the majority of the mines could not maintain their current level of production and employment beyond a few years. It was therefore in the national interest that the Ghana Government find a viable solution to the economic difficulties of the industry to prevent the loss of jobs and revenue, both vital to the well-being of the economy. Only three of the seven mines which were still operating in 1957 had an assured future on the eve of Independence. It was therefore crucial that the programme of grants worked out a mere nine months before Independence should not be interrupted.

Fortunately, there was no change in policy towards foreign-owned interests in Ghana; there was no hint of nationalisation, and the financial aid programme continued. Indeed, the government demonstrated its sympathetic attitude to the economic difficulties of the industry by putting a bill to the Legislative Assembly to reform the tax laws. It was proposed that the existing Minerals Duty should be replaced by a Minerals Profits Tax. In essence, the embodiment of the amending bill would have meant that the existing tax levied on physical

output would be commuted to a tax on profits. This reform in the taxation system was however aborted because of opposition to the bill in Parliament. It was argued that the mining companies would manipulate their accounts in their favour to avoid paying the correct level of taxation (Ghana; Parliamentary Debates, 1957, p.366).

The period of grants to the marginal mines came to an end in July 1958, and it seemed that a further spatial contraction, with the accompanying socio-economic consequences, was inevitable unless the government proved its willingness to lend further support to the industry, and to Bremang and Amalgamated Banket Areas in particular. Although at the end of 1958 the gold mines received an unexpected measure of tax relief by a change in the United Kingdom tax laws, which placed the mining companies into the category of 'Overseas Trading Corporations' subject to lower rates of income tax, their financial difficulties were so great that complementary local measures were still required to save the marginal producers from closure. The Government therefore invited an overseas expert, Dr C.Monture, to advise on the possible adoption of a subsidy scheme for the low-grade marginal gold mines. Although Monture's report was never made public, it resulted in the Government giving interest-free loans to Bremang and Amalgamated Banket Areas. Bremang borrowed £150,000 to transfer one of its dredges from the Ancobra river to the middle Offin valley, and the latter company was lent the same amount for one year to improve its ore reserve position, and a further £150,000 per annum was to be made available to the company on the same terms for a further two years if the first year's development justified the additional assistance (West Africa, 1960, p.105). As a result of these loans to the two companies, the seven mines continued to operate, and 1959/60 produced

a record output: the seven companies produced a combined output of 915,317 ounces of gold, valued at £11,361,372.

Despite these record figures, the industry ran into further economic difficulties, sparked off by the announcement of National Minimum Wage Legislation in September 1960. This meant that the mines were forced to raise their daily wage rates by a further 1s 6d to bring them in line with the statutory minimum wage of 6s 6d per day. This came as a final blow to Amalgamated Banket Areas and Bibiani, the least profitable of the seven gold mining companies. In the case of the former company, the new wage increases merely cancelled out the loan granted by the Government earlier in the year; and in the case of Bibiani, it was already sustaining mounting losses every month by that stage. Neither company was capable of breaking even on costs without financial support from the Government, which was refused. Accordingly, both companies announced their intention to phase out operations to closure; Amalgamated Banket Areas on January 9, 1961, and Bibiani on January 18, 1961. The former company further stated on January 23 that an immediate retrenchment of 1150 workers would take effect (Ghanaian Times, January 24, 1961). The closure of the two mines would have meant a loss of over 7000 jobs, and a loss of over £3,000,000 revenue, of which at least half would have stayed in Ghana in the form of wages, minerals duty, the purchase of local stores and other items.

The Government's response to these announcements of intent to close was not only immediate but dramatic. On January 24, the Government published the 'Mines Abandonment Bill', with an accompanying memorandum dated January 23. The contents of the Bill were not only distasteful but showed a complete reversal of policy toward foreign-owned

mining companies in Ghana. The Chairman of the Ashanti Goldfields Corporation summed up the import of the Bill should it be enacted,

"It would mean not only the end of overseas investment in Ghana's mines but in every other enterprise as well"
(Ghanaian Times, January 26, 1961).

Clause 1 of the Bill made it an offence for the holder of any mining concession to do any act calculated to prejudice the future operation of any underground working without the written permission of the Chief Inspector of Mines. Among the prescribed actions were working or removing shaft pillars, causing or permitting the flooding of workings, or failing to maintain in efficient working condition any plant or machinery used underground. The accompanying memorandum stated that the Chief Inspector of Mines would not permit closure unless the ore-bearing deposits accessible from the underground workings in question had been exhausted, or it was made clear that the workings could never again be operated on an economic basis. Under these conditions, if consent to close was denied to the applicant company, the company's only alternative was to surrender the concession or concessions to the State. But, in order to prevent marginal concessions being surrendered while the company continued to work highly profitable sections on its other mining concessions, it was required that if one concession was surrendered all concessions must be surrendered, according to Section 2 of the Bill. The penalty which would be incurred for a violation of the terms of the Bill were severe; an initial fine of £100,000 or up to ten years' imprisonment, plus an additional fine of £1000 per day for continued offence. Section 7 of the Bill made its operation retrospective to the date of its notification to prevent any of the companies defeating the purpose of the Bill by closing before it could be enacted. It is not surprising that the mining industry protested vehemently against the Bill!

The solution to the crisis came with the Ghana Government's bid of £5,250,000 for the entire share capital of the five marginal mines. The companies involved were Amalgamated Banket Areas Ltd., Ariston Gold Mines (1929) Ltd., Gold Coast Main Reef Ltd., Bremang Gold Dredging Co. Ltd., all members of the London-based Finsbury Pavement House group, and Bibiani (1927) Ltd., a sister company to Ashanti Goldfields Corporation Ltd. The offer was accepted, the 'Mines Abandonment Bill' was withdrawn, and the Ghana State Mining Corporation was born on March 1, 1961. None of the mines had closed down after all. The generous cash offer for the assets of the five companies went some way to alleviating the harsh terms of the aborted bill, since the price paid for the mines was about twice the market value of the shares quoted on the London Stock Exchange at that time. The purchase price had been calculated at the average of the stocks' value over the previous five years, instead of on the existing depressed prices. The takeover of the marginal mines by the State at least ensured that the industry did not contract spatially, and the national interest had been saved even though the problem of marginality remained. It was hoped, at the time of takeover, that the five companies on aggregate would be capable of breaking even on costs as a result of their amalgamation into one operational unit, the Ghana State Mining Corporation, although in fact the takeover was purely a political move, based on social and economic principles; the maintenance of employment in the mining communities, and the foreign exchange earning capacity of gold.

At March 1961, therefore, only two gold mining companies remained in private ownership, Konongo Gold Mines and Ashanti Goldfields Corporation; and neither of these was suffering the same degree of

financial pressure that had forced the crisis in the industry. However, subsequently, the State acquired Konongo in 1965, by which time Konongo had become a marginal enterprise. The Konongo company first approached the Ghana Government as early as 1963 to buy its assets, largely owing to rising development costs and falling profits. Ghana's sterling reserves by that stage were standing at a low level, which precluded either an immediate or a high offer for the Konongo mine. After nearly two years of negotiations, a sum of £150,000 was offered to the company to cover the purchase of all buildings, equipment, machinery, stores, gold in process, and investments in two non-mining concessions held by the company. In addition, it was agreed that the company would pay their African employees severance pay, and a sum of £40,000 was suggested. This the Mines Employees Union rejected, and they demanded the much higher sum of £300,000. The issue was referred to arbitration, and an award of £140,000 was made. The majority of the employees were immediately re-engaged by the State Mining Corporation! In 1965, as in 1961, the Government's intervention had averted the spatial contraction of gold mining in Ghana, and prevented the social disruption which the closure of the mine would have inevitably caused. The survival of the gold mining industry in Ghana after 1961 is due entirely to Government policy, which demonstrates the inter-relationship between politics and geography.

In Part III of the study, the operations of the State Gold Mining Corporation are discussed in detail and its performance analysed in the light of the socio-economic principles which motivated its creation. The contemporary contribution of gold mining in the economy of Ghana is also examined.

THE HISTORY OF THE UNITED STATES

CHAPTER I

The history of the United States is a story of growth and expansion. It begins with the first settlers who came to the shores of the continent in search of a better life. They found a land of vast resources and boundless opportunity. Over the years, the United States has grown from a small colony to a great nation, a leader in the world. Its people have shown a remarkable capacity for innovation and progress, and its values of freedom and democracy have inspired others around the globe.

PART III

A CONTEMPORARY SURVEY

In the contemporary survey, we look at the current state of the United States. We examine the challenges it faces in the 21st century, from economic inequality to environmental concerns. We also explore the opportunities that lie ahead, as the nation continues to evolve and adapt to a rapidly changing world. The survey highlights the resilience of the American spirit and the potential for a bright future. It is a call to action for all citizens to work together to build a better, more just, and more prosperous society for all.

CHAPTER 7

THE MINES OF THE STATE GOLD MINING CORPORATIONINTRODUCTION

The takeover of five of the seven privately-owner gold mining companies by the Ghana Government in 1961 was of profound significance at many levels. Historically, it was a landmark in the structure of ownership of the industry which had been run for over eighty years by foreign limited liability companies. Politically, the takeover expressed the political ideology of a newly independent State, striving to match its newly-gained political freedom with economic independence. Socially, the takeover of the marginal mines assured the continued support of long-established mining communities and prevented large-scale unemployment in these areas. Geographically, the takeover had no immediate impact, in that the change in ownership did not alter the spatial pattern of gold mining in Ghana. However, in an indirect way, the takeover was of profound geographical significance in that it served to perpetuate the seven-point distribution which would certainly have contracted but for the Government's intervention. In economic terms, only Konongo Gold Mines Ltd., and Ashanti Goldfields Corporation Ltd., would have remained on the economic landscape after 1961; two of the marginal mines would have closed immediately and the others would have ceased profitable operations a few years later. In these terms, therefore, the purchase of the marginal mines by the Ghana Government in 1961 did affect the geography of gold mining, albeit indirectly. The very nature of this indirect effect of the takeover serves to illustrate the two-way relationship between politics and geography.

The purpose of this chapter is to give a brief outline of the growth and development of the mines which are incorporated as the State Gold Mining Corporation. In this context, these histories serve to link the study backwards to Part II, by highlighting some of the aspects discussed in Chapters 3-6, and forwards to the main body of Part III by setting the scene for the detailed analysis of the performance of the State mines in Chapters 8-10.

The State Gold Mining Corporation in its present form was incorporated in 1965, by Legislative Instrument No.400 of 1965, taking over from the previously established Ghana State Mining Corporation, formed in 1961, to include Konongo Gold Mines purchased by the Ghana Government in 1965. From 1961 to 1965, the names of the original companies were retained, but in 1965, new names were introduced. Thence, Amalgamated Banket Areas Ltd. became Tarkwa goldfields; Ariston Gold Mines (1929) Ltd., and Ghana Main Reef Ltd., became Prestea goldfields; Bibiani (1927) Ltd., became Bibiani goldfields; Bremang Gold Dredging Co. Ltd., became Dunkwa goldfields; and Konongo Gold Mines Ltd., became Konongo goldfields. With the addition of Konongo to the public sector in 1965, there remained only one gold mining company in private ownership, Ashanti Goldfields Corporation Ltd., at Obuasi. In January 1969, this company was purchased by Lonrho, and under the purchase agreement, the Ghana government is part owner, holding 20% of the shares, with an option to purchase a further 20%. By 1969, therefore, the State was the sole owner of six gold mining enterprises and a shareholder in the seventh. By imposing a high rate of taxation on gold exports, the State also takes a high percentage of the profits accruing from the Ashanti mine. In 1968, the State mines produced 35% of the total gold output by value, and gave employment to

60% of the labour engaged in gold mining, while the private sector contributed 65% of the value of gold exports but employed only 40% of the total labour force in the industry.

TARKWA GOLDFIELDS

This is the sole mining enterprise working the banket deposits in Ghana. The property covers an area of 85 square miles, made up of contiguous concessions acquired from time to time. The offices and mill are centrally located in the property at Abbontiakoon (A'Koon), some three miles north of the town of Tarkwa, through which the Government railway passes. The headquarters of the State Gold Mining Corporation are in Tarkwa. Only two shafts are in active use, the A'Koon Vertical shaft (A.V.S.) and the Fanti South shaft, three miles to the north-east. A third shaft, the Ferguson Inclined shaft, is currently being sunk at the north-eastern extremity of the property to exploit the extension of the reef in that direction (Map 7.1).

Tarkwa goldfields was formerly the property of Amalgamated Banket Areas Ltd. (A.B.A.), one of the members of the London-based Finsbury Pavement House group of companies. In 1961, the Ghana Government offered 1s for each of the 19,232,669 3s stock units (Skinner, 1963). This offer was a generous one, since by that year the company was in a state of virtual collapse in financial terms. Indeed, A.B.A. had never been a particularly attractive investment, as witnessed by the poor performance of its shares on the London Stock Exchange (Table 7.1) and by its equally poor record of dividend payments (Table 7.2).

A.B.A. was registered in 1935, with an authorised capital of £3,300,000 issued in 3s stock units. Since the banket ore is of a

MAP 7-1

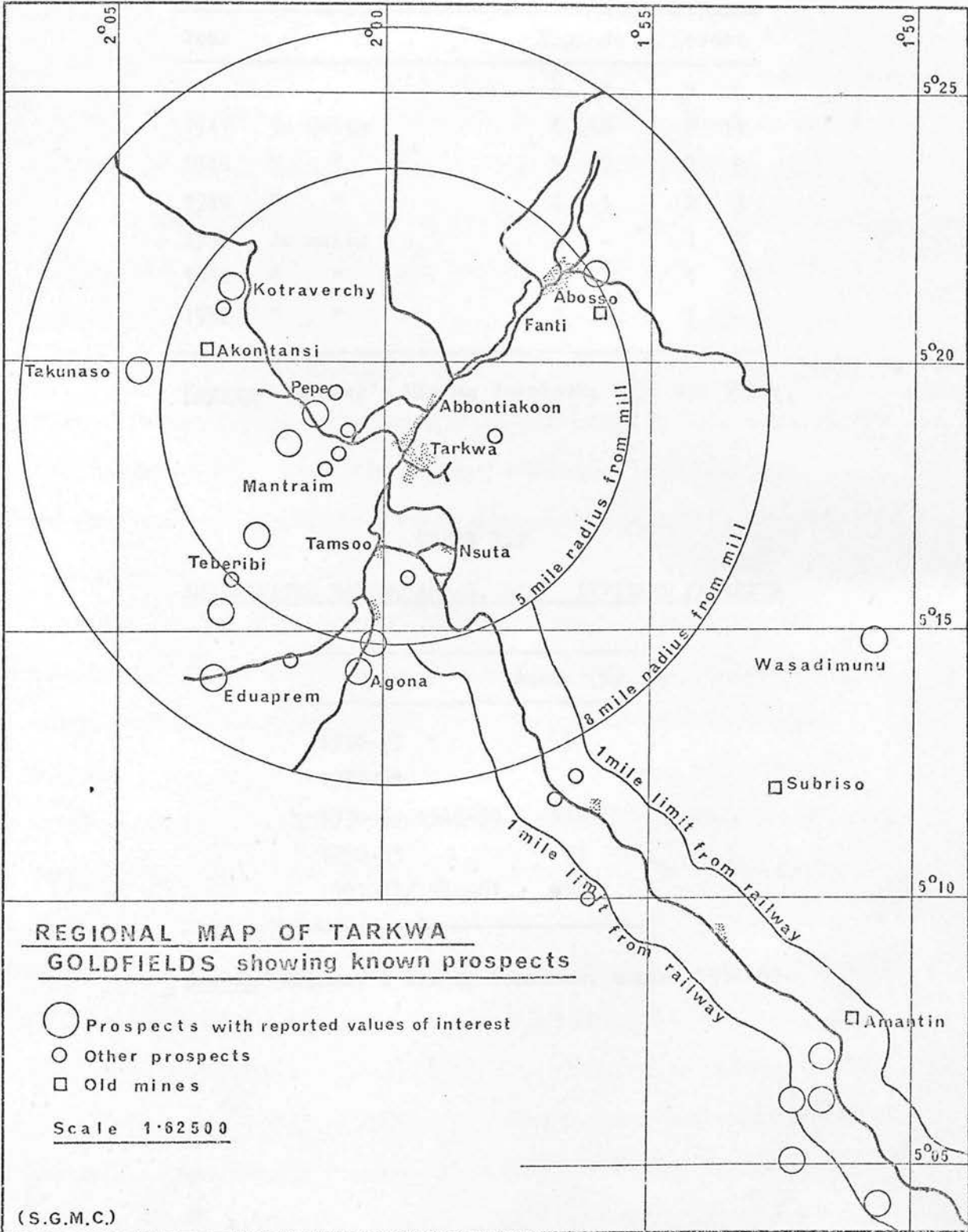


TABLE 7.1

AMALGAMATED BANKET AREAS, LTD. SHARE QUOTATIONS

(Selected Years)

Year		Highest		Lowest	
		s	d	s	d
1947	5s units	6	10	3	11
1948	" "	5	10	2	9
1949	" "	4	1	2	3
1950	3s units	3	-	1	9
1951	" "	2	11	1	9
1952	" "	2	1	1	-

Source: Skinner's Mining Yearbook, 1950 and 1953.

TABLE 7.2

AMALGAMATED BANKET AREAS, LTD. DIVIDEND PAYMENTS

Year	Amount(%)
1936-37	5
1937-38	5
1938-39/1949-50	NIL
1950-51	2½
1951-52/1960-61	NIL

Source: Skinner's Mining Yearbook, annual 1938-63.

low grade relative to the quartz deposits in Ghana, A.B.A. aimed at acquiring a large enough area to permit a sufficiently large tonnage of ore to be mined at a profit. The company's original concession area covered 41.4 square miles, made up by the acquisition and amalgamation of A'Koon mine, from Tarkwa Gold Areas Ltd., and the Tacquah mine, from Tarkwa Southern Mines Ltd. Operations were later expanded by opening up and working the Mantrain, Pepe and Akontasi mines, all situated on the north-west limb of the Tarkwa syncline. The ore was initially treated in a small and old 'stamp and tube' mill, with a capacity of 9000 tons per month, but in 1940 this was superceded by a new mill with a capacity of 60,000 tons per month, this tonnage to be made up from surface and underground sources of the order of 25,000 and 35,000 tons respectively. The company also invested in two new shafts, A.V.S. and Mantrain, and erected a walking dragline to exploit the basket outcrop at Pepe. The fruits of these pre-war investments were delayed, since A.B.A., being a low-grade property, was put on a 'care and maintenance' basis from 1943 to 1946 under the wartime concentration scheme. All production and development ceased in that three-year period.

Meanwhile debts accumulated, and the company was forced to acquire more concessions to enable it to increase the scale of mining to pay off the accumulated debts. It was at this stage that the directorate made the vital mistake of merely re-organising the original capital structure of the company instead of refloating the company and attracting fresh capital to pay for the purchase of the new concessions. The original authorised capital of £3,300,000 was reduced to £2,115,000 and issued in share units of 3s and 5s each, while the difference of £820,000 was issued credited as fully paid up shares for the purchase

of the new areas. Thus, in 1949, the new amalgamation involved the adjacent mines of Gold Coast Banket Areas Ltd., South Banket Areas Ltd., and Banket Goldfields Ltd. The treatment plant on the Fanti section of the property was closed down in 1950, and the central plant at A'Koon was modified to treat some 80,000 tons per month. These new investments proved too costly in relation to the expected returns from mining, and from 1951 no dividend was declared. Indeed, dividends had been declared in only three years prior to 1950/51, and these were small.

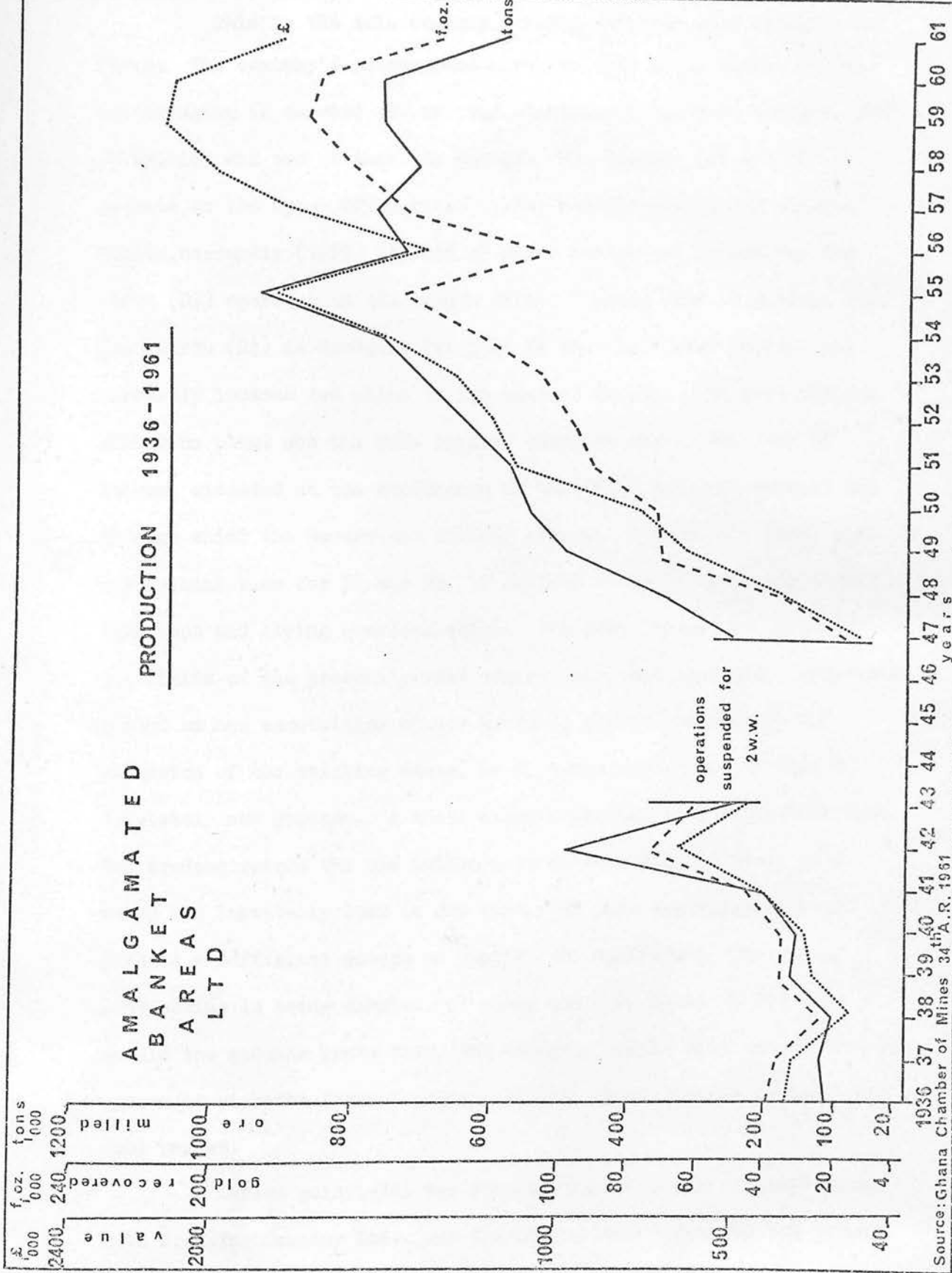
Thus, by 1950, A.B.A. was operating eight mines on the Tarkwa range, and since all had been acquired at different times, mining methods and equipment were far from standardised. The 1949 amalgamation was not successful, since working costs continued to rise while profits fell, and the company was forced to shut down sections of the property; Akontasi was not reopened after the second world war and Pepe was closed in 1956. Despite a Government grant of £100,000 in the late 1950s, a further contraction of operations became necessary in 1961. The future of A.B.A. was delicately balanced at takeover. Its chequered history has been best summed up by a former consulting engineer of the company, when he stated,

" ... the history of the separate companies prior to 1950 and afterwards during amalgamation to the time of takeover by the Government makes dismal reading" (S.G.M.C.).

Subsequently, the Tamsoo section was closed down in 1964 and the Mantrain section in 1965. A.B.A. produced 1,998,099 fine ounces of gold, valued at £24,623,763, from 1935 to 1961 (Fig.7.1). Since takeover to 1968 Tarkwa goldfields has contributed 23% of the State mines' aggregate gold output.

**A M A L G A M A T E D
B A N K E T
A R E A S
L T D**

PRODUCTION 1936 - 1961



Source: Ghana Chamber of Mines 34th A.R., 1961

DUNKWA GOLDFIELDS

This is the sole company working alluvial gold deposits in Ghana. The company's concessions cover an area of 61 square miles, and dredging is carried out by four electrically-powered dredges, two of British and two of American design. Two dredges (D1 and D2) operate on the Upper Offin river valley and its associated alluvial floats, currently (1969) located 46 miles north-west of Dunkwa; the third (D3) operates in the middle Offin, 9 miles west of Dunkwa; and the fourth (D4) is dredging for gold in the Jimi river valley, and currently located ten miles to the east of Dunkwa. The mine offices, reduction plant and the main housing compound are in the town of Dunkwa, situated at the confluence of the Offin and Jimi rivers, and through which the Government railway passes. A secondary camp, the operational base for D1 and D2, is located at Subin where additional workshops and living quarters exist. All four dredges are reaching the limits of the presently-held concessions, and continued operations depend on the acquisition of new dredging grounds, either by the extension of the existing areas, or by transferring the dredges to completely new grounds. A third alternative has been suggested, that the dredges rework the old tailings to recover much of finer gold which was inevitably lost in the past, but this would probably not produce a sufficient return to justify the operation. Currently, prospecting is being carried out along the Jimi ahead of D4, and should the grounds prove rich, the dredging rights will be acquired by agreement with the Ashanti company through whose concession area the Jimi passes.

Dunkwa goldfields was formerly the property of the Bremang Gold Dredging Company Ltd., and its assets were bought by the Ghana

Government in 1961. At that date, Bremang was still a profitable concern, and the company would not have sold out; but since the company was one of the Finsbury Pavement House group, whose entire share capital in Ghana was involved in the takeover bid, the directorate decided to accept the Government's offer of 3s 9d for each of the 5,216,848 2s stock units (Skinner, 1963). This offer represented a fair price, according to the recent value of the shares as quoted on the Stock Exchange (Table 7.3), and at the same time was a fair compensation to the shareholders, whose expected dividends in the following few years would have inevitably decreased as the grounds were exhausted. Bremang had a relatively good record of dividend payments in the past (Table 7.4).

Bremang was registered in 1936, with an authorised capital of £1,000,000, issued in 5s stock units. The original concessions covered 33.47 square miles of contiguous land, extending some 40 miles along the Ancobra river valley upstream from Prestea (Map 7.2). Although it was envisaged as a four-dredge operation, only two dredges had been commissioned before the outbreak of the second world war, and dredging was begun in August and September 1938. The company's other dredges did not begin operating until 1945 and 1947. Each dredge was based at a different section along the Ancobra, with the headquarters of the entire operation at Hiawa, midway along the river. In addition, several temporary camps, generally within half a mile of each dredge, were established to house the operational labour force attached to each dredging unit. As the dredges progressed upstream, these camps moved with them. The permanent focus of operations, typical of deep-level mining, is therefore not characteristic of dredging. The focal point of a dredging operation is continuously shifting horizontally, and

MAP 7-2

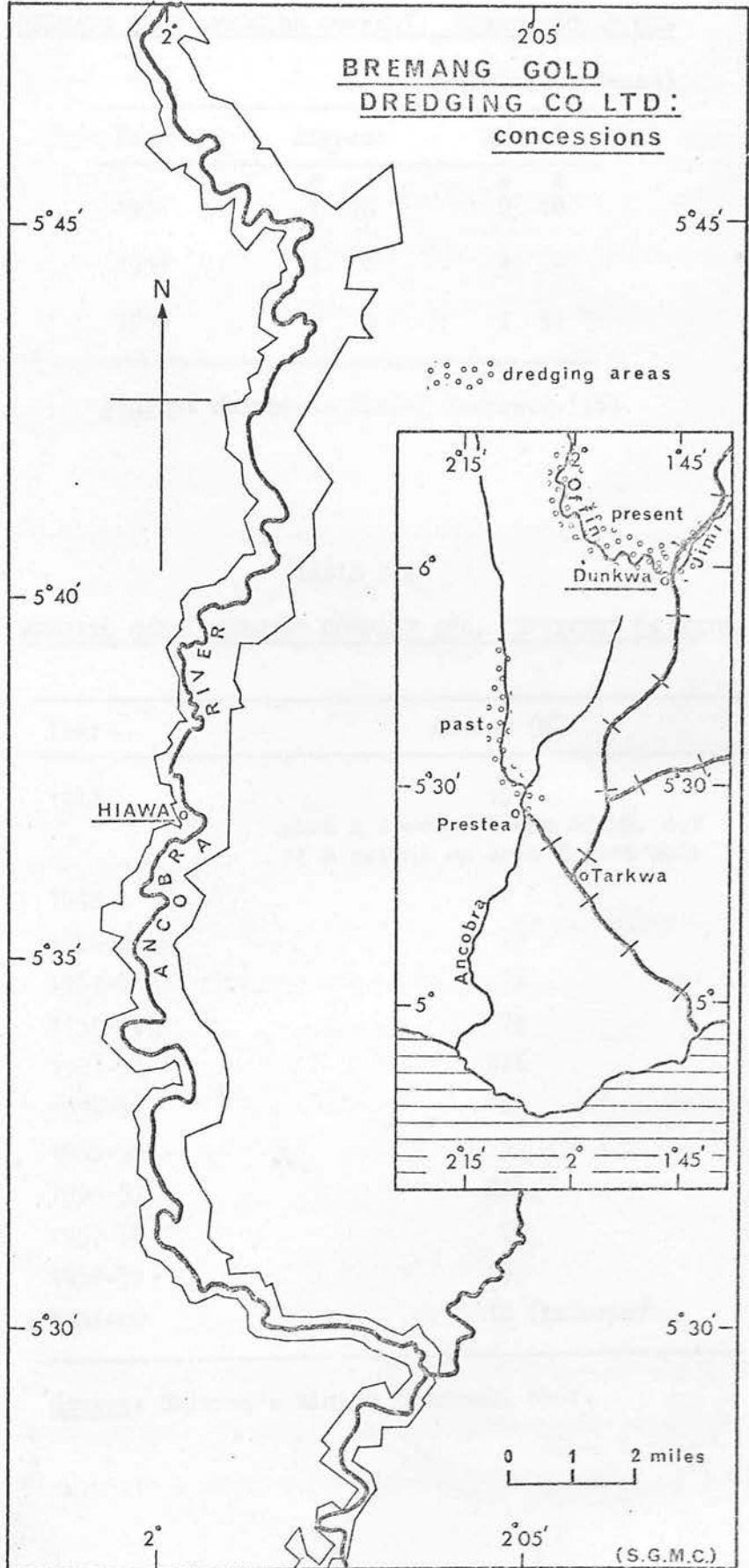


TABLE 7.3

BREMANG GOLD DREDGING COMPANY. SHARE QUOTATIONS

(Selected Years)

Year	Highest		Lowest	
	s	d	s	d
1958	1	10	0	10
1959	3	8	1	-
1960	3	10	1	11

Source: Skinner's Mining Yearbook, 1963.

TABLE 7.4

BREMANG GOLD DREDGING COMPANY LTD. DIVIDEND PAYMENTS

Year	Amount (%)
1948	10 plus a special bonus of 5%, out of a refund on Gold Export Duty
1949	10
1950-51	7½
1951-52	7½
1952-53	7½
1953-54	NIL
1954-55	5
1955-56	5
1956-57	NIL
1957-58	7½
1958-59	15
1959-60	10 (interim)

Source: Skinner's Mining Yearbook, 1961.

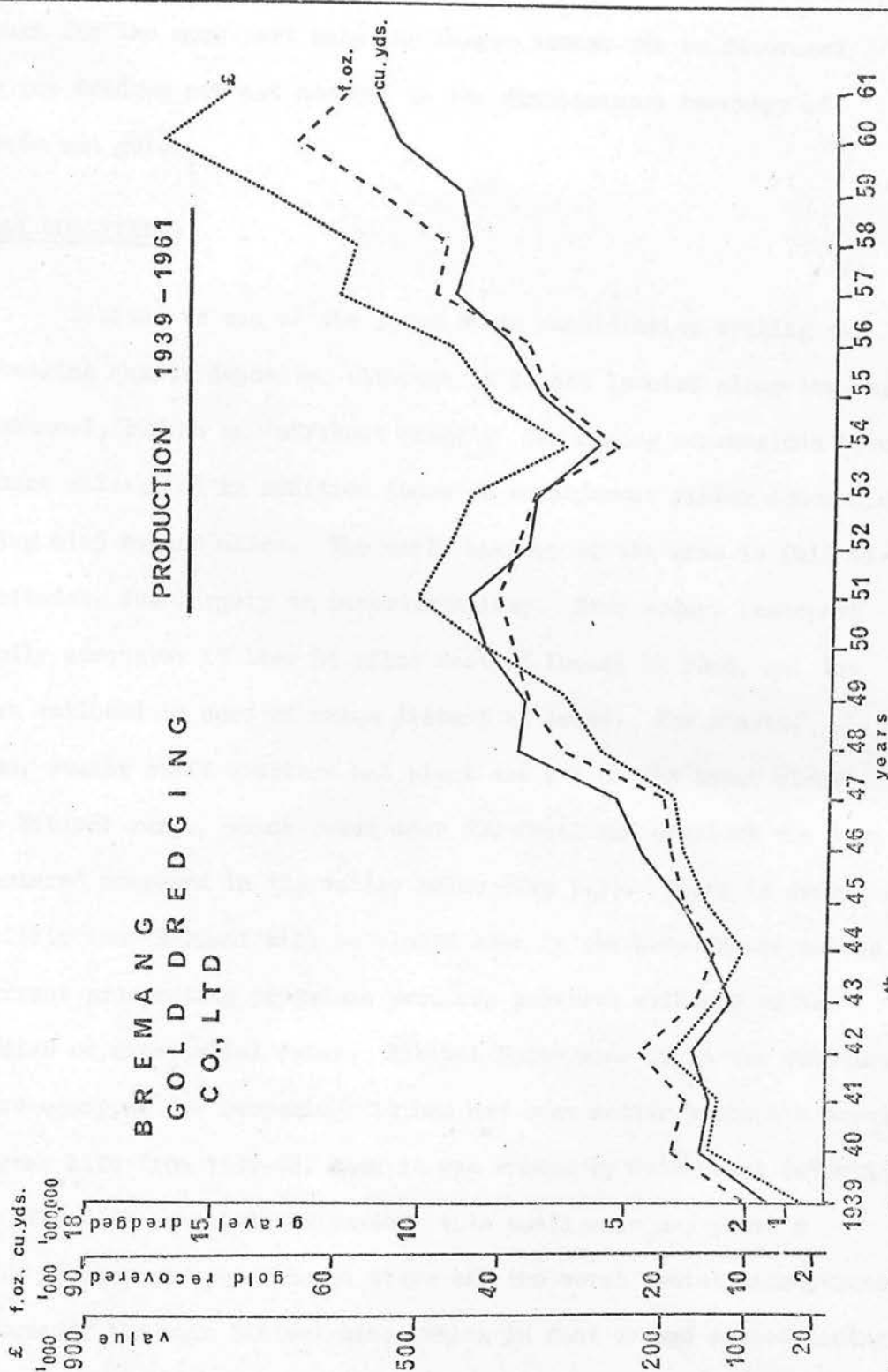
lacks the same degree of permanency of site attached to deep-level mining activity.

By 1950, much of the valuable ground had been worked, and the company therefore raised fresh capital to cover the purchase of new concessions, in the Offin and Jimi river valleys, the areas subsequently inherited by the State in 1961. It was estimated that the newly-leased grounds would extend the working life of the company by a further 25 years, from 1953, by which date some 85% of the original grounds along the Ancobra were worked out. All four dredges were moved between 1952 and 1959, at a cost of £1,250,000, excluding the costs of preparing new housing sites, rebuilding the reduction plant, workshops, offices and cutting access roads to the dredge river-sites. The entire removal operation, from dismantling the dredges on the Ancobra, transporting them some 60-80 miles to their new paddock sites, by road, railway, and rebuilding them at their final destinations was paid for out of profits, except for the debenture loan from the Ghana Government between 1956 and 1958. Bremang had qualified for financial assistance at that period, as the result of a 10% wage increase given after the strike of 1955-56, and the company used the loan to complete the transfer of its dredges which would otherwise have been delayed owing to the increased labour costs.

Bremang had a successful history, and from 146,750,441 cubic yards of auriferous gravel it recovered 744,282 fine ounces of gold, valued at £8,299,253 between 1938 and 1961 (Fig.7.2). Since takeover, the dredging subsidiary has produced 16% of the State mines' aggregate gold output to 1968. It has also proved the most profitable asset of the Corporation, in that it maintained a positive balance account until 1964, and still shows operating profits in certain months. The

**BREMANING
GOLD DREDGING
CO., LTD**

PRODUCTION 1939 - 1961



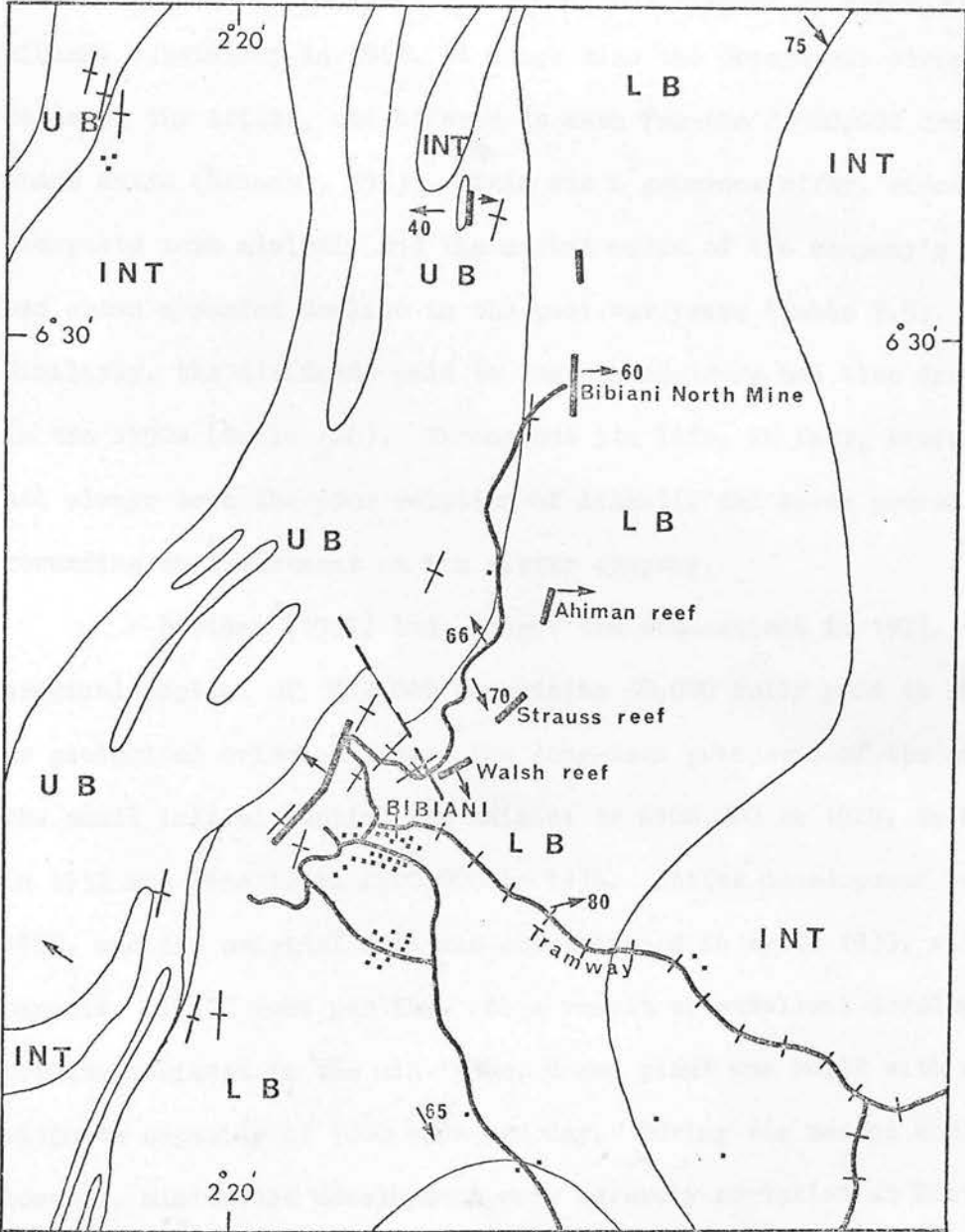
Source: Ghana Chamber of Mines 34th A.R. 1961

occasional occurrence of diamonds in the gravels adds to the revenue, although for the most part only the larger stones can be recovered since the dredges are not adapted to the simultaneous recovery of diamonds and gold.

BIBIANI GOLDFIELDS

Bibiani is one of the three State subsidiaries working the gold-bearing quartz deposits, although it is not located along the main gold channel, but in an 'offshoot crack'. The mining concessions cover 16 square miles, and in addition there is an adjacent timber concession covering 61.5 square miles. The early history of the mine is full of vicissitudes, due largely to inaccessibility. Even today, transport is hardly adequate; it lies 54 miles west of Kumasi by road, and the nearest railhead is some 24 miles distant at Awaso. The shafts, offices, senior staff quarters and plant are set on the lower slopes of the Bibiani range, which reach over 500 feet, and overlook the town and workers' compound in the valley below (Map 7.3). There is every possibility that Bibiani will be closed down in the near future unless the current prospecting programme produces positive evidence of new ore-bodies of substantial value. Bibiani North mine is in the meantime being re-equipped for reopening; it has not been active since its short three-year life from 1939-42, when it was worked by Gold Coast Selection Trust. There is some indication that this small mine may prove a fruitful investment, or at least stave off the worst social disruptions of closure of the main Bibiani mine, which in fact ceased active mining in September 1968. It has been on a 'care and maintenance' basis ever since pending the results of the current prospecting programme.

MAP 7-3



BIBIANI GOLDFIELDS: location

1: 62,500

- UB Upper Birrimian
- LB Lower Birrimian
- INT Intrusives
- Gold reefs
- 40 Direction & amount of dip
- ⊥ Vertical strata

(after Hirst 1946)

Bibiani goldfields was formerly the property of Bibiani (1927) Ltd., a sister mine to Ashanti Goldfields Corporation Ltd. Owing to its increasing marginality, the management decided to close their Bibiani subsidiary in 1961, at which time the Government stepped in to avert the crisis, and offered 4s each for the 2,500,000 ordinary 4s share units (Skinner, 1963). This was a generous offer, since future prospects were minimal, and the market value of the company's shares had shown a marked decline in the post-war years (Table 7.5). Similarly, the dividends paid to the shareholders had also dropped in the 1950s (Table 7.6). Throughout its life, in fact, Bibiani mine had always been the poor relation of Ashanti, and never proved as rewarding an investment as its sister company.

Bibiani (1927) Ltd. bought the concessions in 1927, with an original capital of £12,000 comprising 30,000 fully paid 4s shares. As geological evidence proved the long-term prospects of the mine, the small initial capital was raised: to £100,000 in 1928, to £400,000 in 1932 and finally to £500,000 in 1936. Active development began in 1930, and the original mill was commissioned in April 1933, with a capacity of 100 tons per day. As a result of excellent development results achieved in the mid-1930s, a new plant was built with an ultimate capacity of 1000 tons per day. During the second world war, however, mining and development were severely curtailed at Bibiani owing to the shortage of supplies, and it was some time after the war that ore reserves reached the high pre-war level. Ore had to be quarried from the surface reef outcrop, in fact, to allow underground development work to make up the wartime backlog, but like all the low-grade properties rising costs reduced the profits after 1946.

TABLE 7.5

BIBIANI (1927) LTD.		SHARE QUOTATIONS			
		(Selected Years)			
Year		Highest		Lowest	
		s	d	s	d
1947	4s units	30	6	22	1
1948		27	-	13	9
1949		20	-	13	3
1952		8	10	5	4
1953		7	7	4	7
1954		6	9	3	9
1958		2	9	1	3
1959		4	8	2	-
1960		4	5	1	11

Source: Skinner's Mining Yearbook,
1950, 1955 and 1961.

TABLE 7.6

BIBIANI (1927) LTD.		DIVIDEND PAYMENTS
Year	Amount (%)	
1934-35	12 $\frac{1}{2}$	
1935-36/36-37	15	
1937-38/1942-43	25	
1943-44	20	
1944-45/45-46	25	
1946-47	15	
1947-48	10	
1948-49	12 $\frac{1}{2}$	
1949-50	42	
1950-51	20.83	
1951-52	17 $\frac{1}{2}$	
1952-53/53-54	10	
1954-55	5	
1955-56	NIL	
1956-57/59-60	10	

Source: Skinner's Mining Yearbook,
1936-1961.

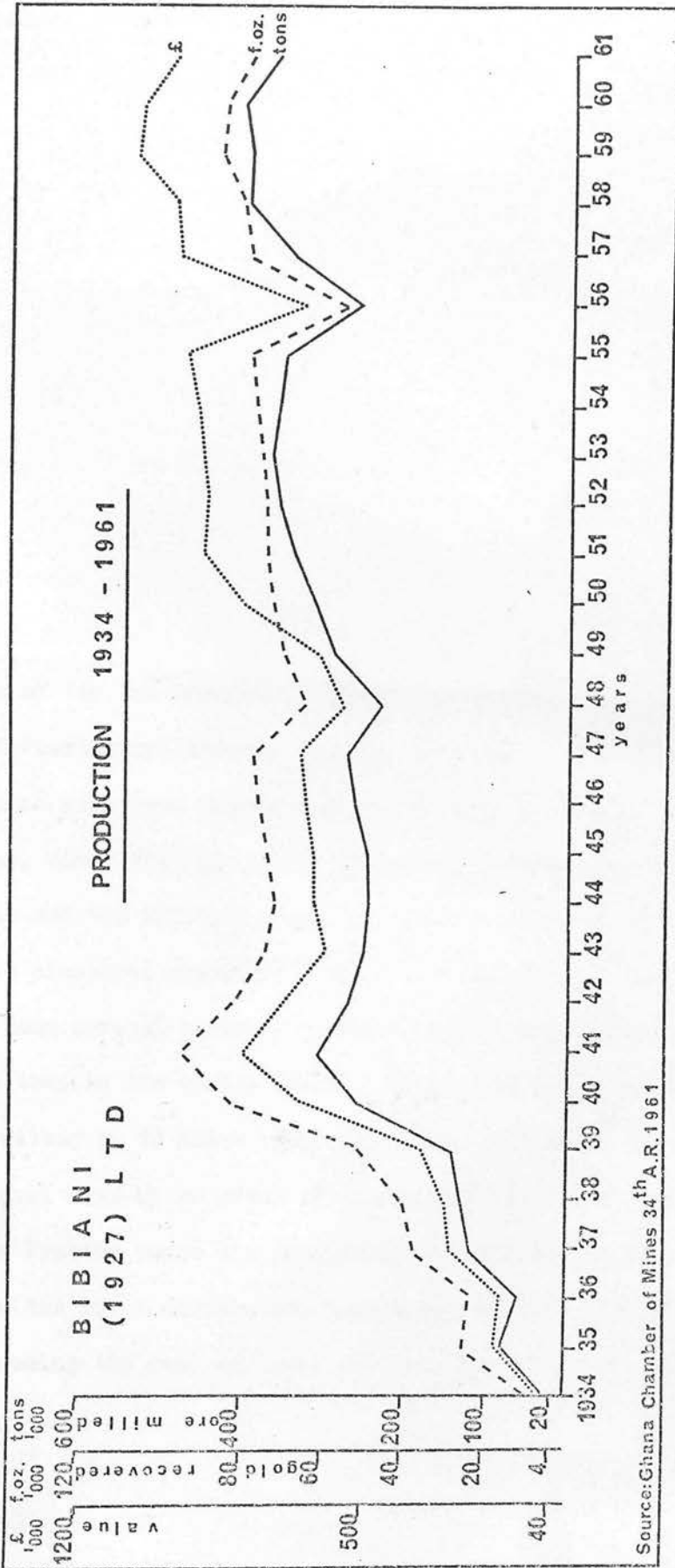


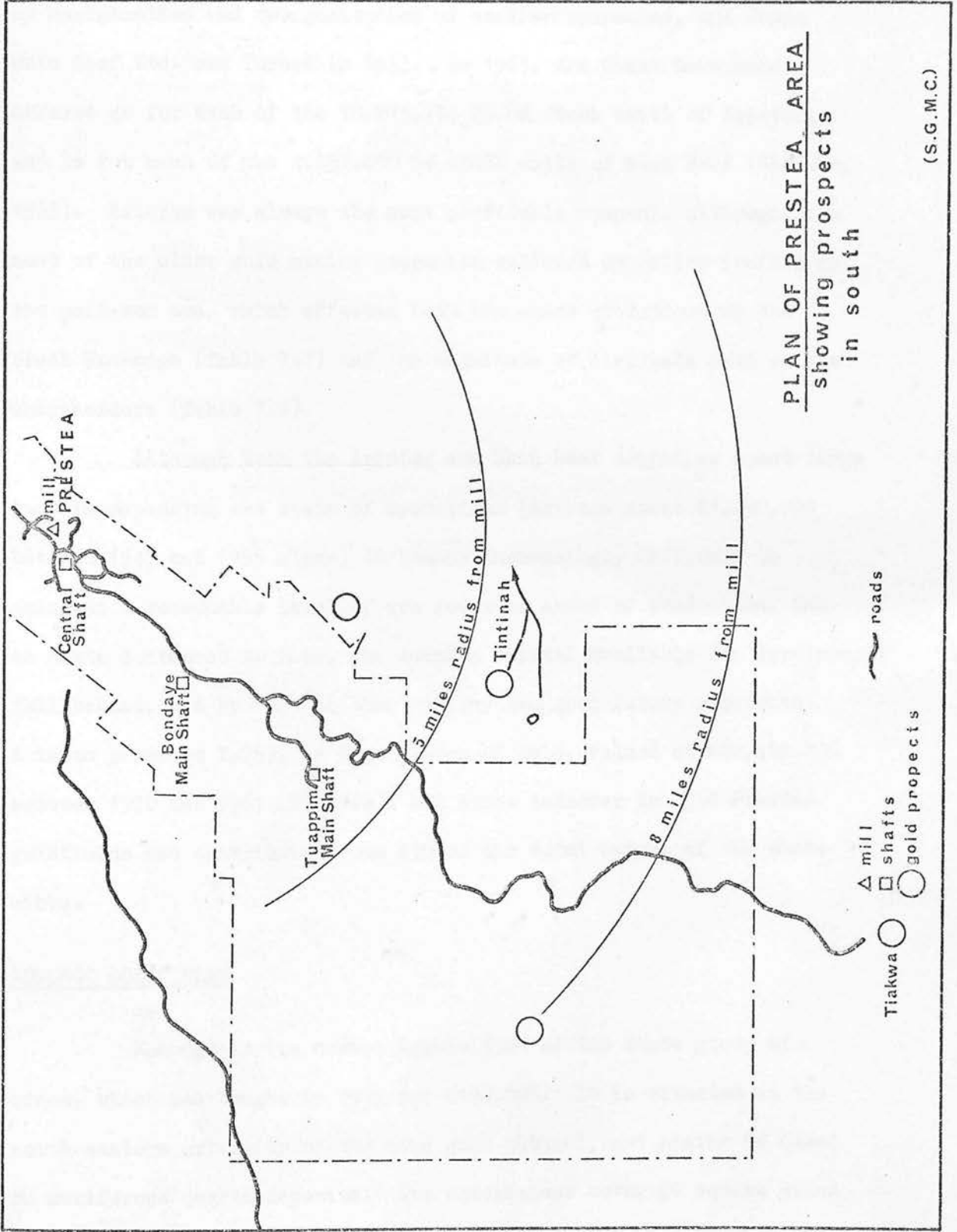
FIG 7-3

Between 1934 and 1961, Bibiani produced 1,868,335 fine ounces of gold, valued at £18,982,976 (Fig.7.3). When the State purchased Bibiani, it was very near the end of its working life, the ore reserves having shown a drastic decline from the mid-1950s in spite of the efforts of its former owners to halt the decline. Since 1961, Bibiani has produced 14% of the aggregate gold output of the State mines, but it has proved a very heavy financial burden.

PRESTEA GOLDFIELDS

The mines at Prestea are based on gold-bearing quartz deposits, and they are located at the southern end of the main gold channel. Prestea goldfields is an amalgamation of two former private companies, Ariston Gold Mines (1929) Ltd., and Ghana Main Reef Ltd., the smaller of the two concerns. Their operations are centred on the villages of Prestea and Bondaye respectively (Map 7.4). Prestea has the appearance of a true mining town, much more so than all the other mining towns, since the main shaft is located practically astride the main street, and the offices, plant and African workers' housing compound are clustered around it. Only the senior staff quarters are set apart, some several hundreds of feet along the high ridges overlooking the town in the valley below. Prestea is connected to the main line railway by 18 miles of feeder line, and linked to the main Takoradi-Kumasi road by 20 miles of unsurfaced, laterite 'road'. The mines on the Prestea range are frequently cut off during excessive wet seasons when the river Ancobra has been known to rise over 20 feet in an hour, flooding the road and rail bridges, the effective links with outside.

MAP 7.4



The combined concession areas cover 42 square miles in the Prestea district. Ariston Gold Mines (1929) Ltd. was formed in 1929, by amalgamation and reorganisation of earlier companies, and Ghana Main Reef Ltd. was formed in 1933. In 1961, the Ghana Government offered 4s for each of the 10,285,714 2s 6d stock units of Ariston, and 3s for each of the 4,457,450 5s stock units of Main Reef (Skinner, 1963). Ariston was always the more profitable company, although like most of the other gold mining companies suffered dwindling profits in the post-war era, which affected both the share quotations on the Stock Exchange (Table 7.7) and the magnitude of dividends paid to the shareholders (Table 7.8).

Although both the Ariston and Main Reef companies spent large sums in expanding the scale of operations (Ariston spent £1,250,000 between 1947 and 1955 alone) it became increasingly difficult to maintain a reasonable level of ore reserves ahead of production, and as costs continued to rise, the surplus capital available for development fell behind, and by 1961 neither company had good future prospects. Ariston produced 2,759,246 fine ounces of gold, valued at £28,420,736 between 1930 and 1961 (Fig.7.4), and since takeover to 1968 Prestea goldfields has contributed some 45% of the total output of the State mines.

KONONGO GOLDFIELDS

Konongo is the newest acquisition of the State group of mines, which was bought in 1965 for £150,000. It is situated at the north-eastern extremity of the main gold channel, and mining is based on auriferous quartz deposits. Its concessions cover 20 square miles in the Ashanti-Akim district (Map 7.6).

TABLE 7.7

ARISTON GOLD MINES (1929) LTD. SHARE QUOTATIONS

(Selected Years)

Year		Highest		Lowest	
		s	d	s	d
1947	2s 6d stock units	13	10 $\frac{1}{2}$	9	1
1948		11	4	7	3
1949		10	6	6	10
1958		4	10	3	7
1959		5	11	3	5
1960		5	7	2	5

Source: Skinner's Mining Yearbook, 1950 and 1961.

TABLE 7.8

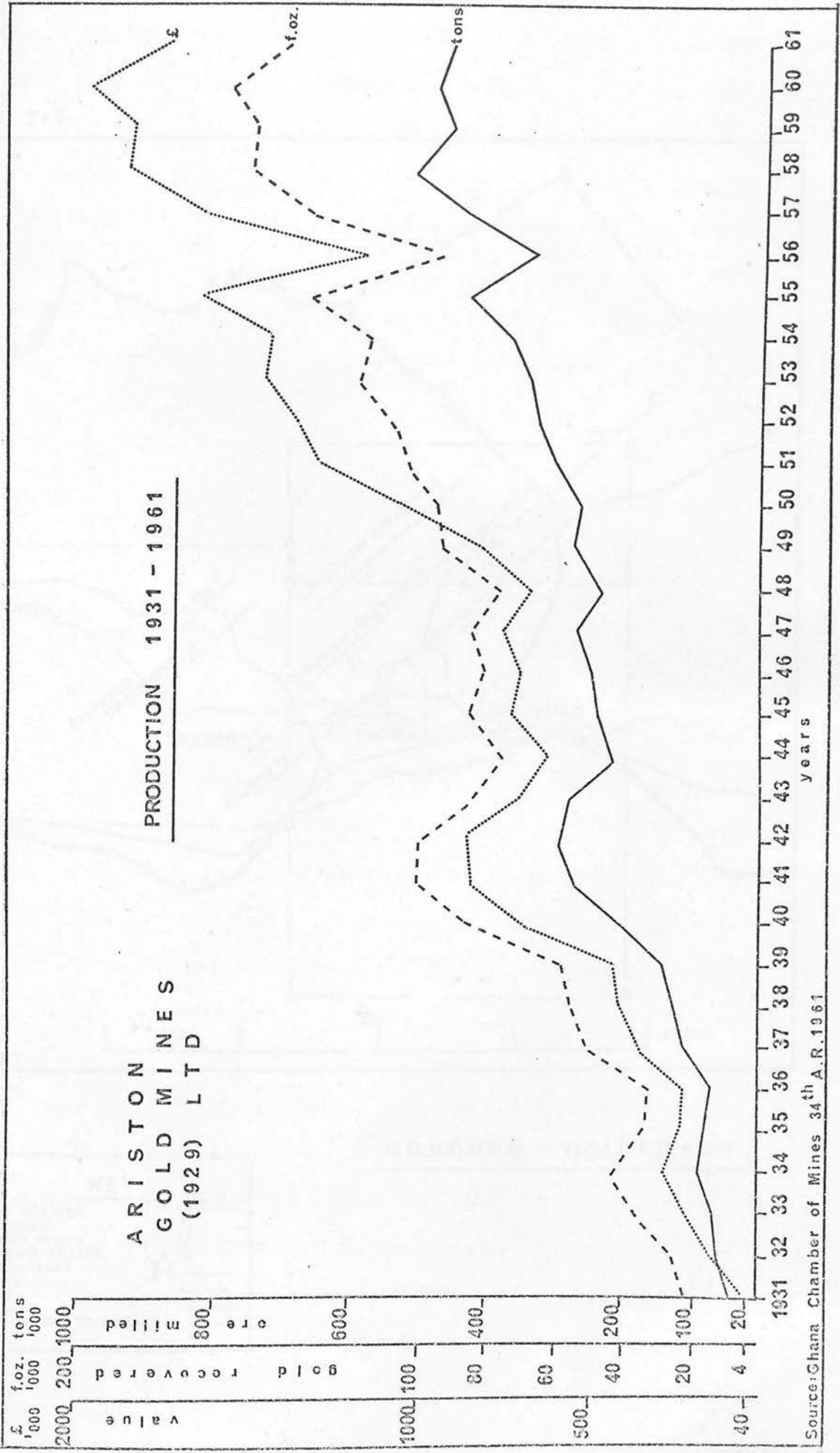
ARISTON GOLD MINES (1929) LTD. DIVIDEND PAYMENTS

Year	Amount (%)
1932-33-34	20
1934-35	7 $\frac{1}{2}$
1935-36	5
1936-37	10
1937-38	7 $\frac{1}{2}$
1938-39	20
1939-40-41	17 $\frac{1}{2}$
1941-42-43	15
1943-44-45-46-47-48	20
1948-49	5
1949-50	30
1950-51	25
1951-52-53-54	30
1954-55	10
1955-56	5
1956-57	10
1957-58	30
1958-59	20
1959-60	10

Source: Skinner's Mining Yearbook,
1950 and 1961.

ARISTON
GOLD MINES
(1929) LTD

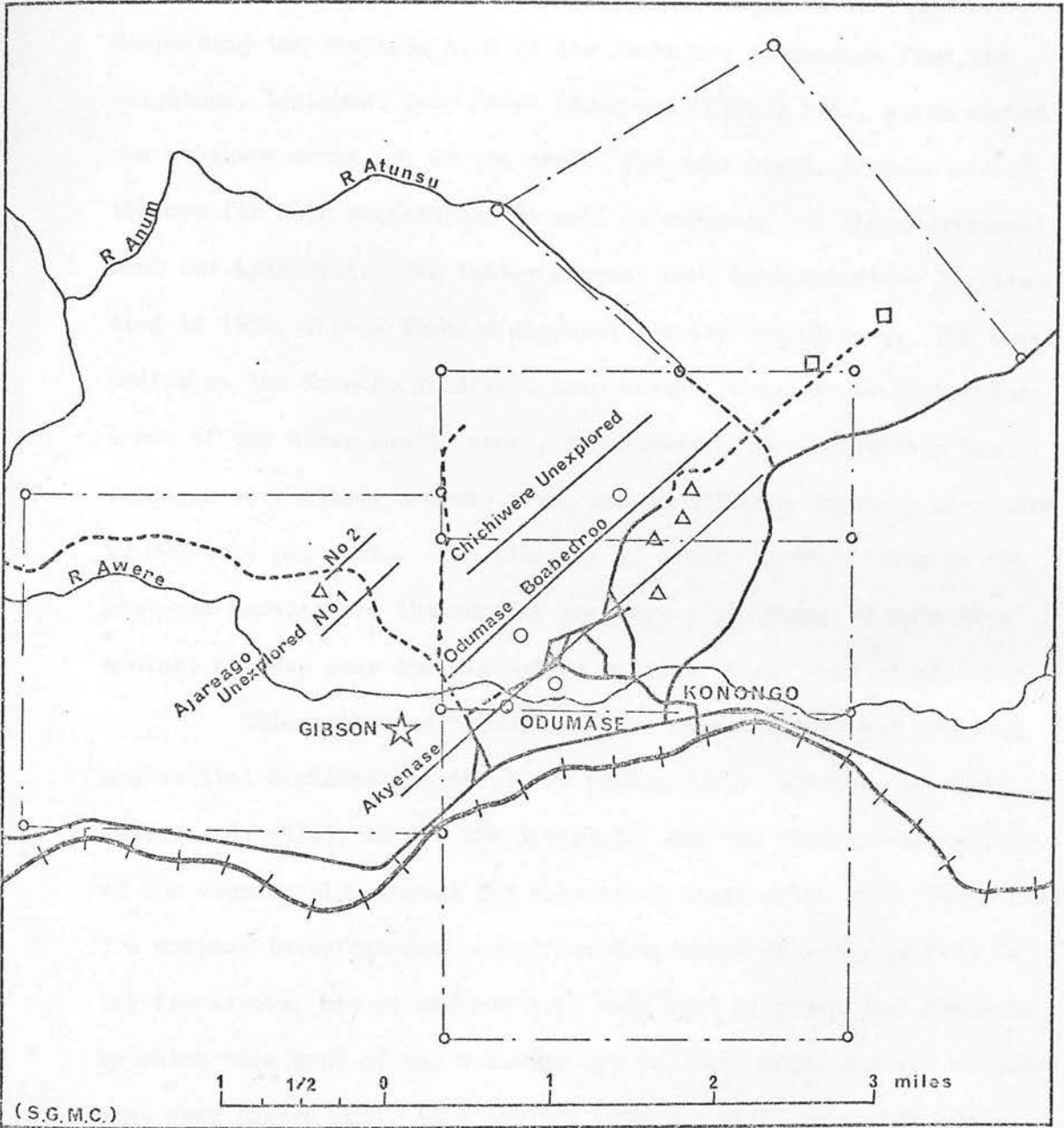
PRODUCTION 1931 - 1961



Source: Ghana Chamber of Mines 34th A.R. 1961

FIG. 7.4

MAP 7-5



(S.G.M.C.)

KONONGO GOLDFIELDS

KEY	
Main Strikes	—
Prospects	△
Shafts in use	○
Disused shafts	□
Gibson Reef	☆
Roads	—
Paths	- - -
Railway	+ + +
Concession Boundaries	- · - · -

The former owner of this property was Konongo Gold Mines, registered in 1933, with an authorised capital of £675,000. The company originally acquired only $2\frac{1}{2}$ square miles in concessions, comprising the southern half of the Boabedroo concession from its neighbour, Lyndhurst Deep Level (Gold and Silver) Ltd., which worked the northern extension of the reef. For some years, Konongo milled the ore for both properties, as well as carrying out the development work for Lyndhurst. The latter company went into voluntary liquidation in 1956, whence Konongo acquired all its concessions. The ore-bodies on the Konongo goldfield have always proved to be richer than those of the other quartz mines, and consequently, relatively low tonnages were mined, and the plant had an ultimate capacity of a mere 10,000 tons per month. The pressure of rising working costs in the post-war decades led the company to adopt a programme of selective mining, whereby only the high-grade pockets of ore were mined.

This policy certainly paid the shareholders, who received substantial dividends in the 1950s (Table 7.9). However, as these reserves dwindled, so did the dividends, and the ruling share prices of the company also showed the inevitable crash after 1960 (Table 7.10). The company therefore approached the Government as early as 1963 to buy its assets, but it was not till 1965 that agreement was reached, by which time most of the valuable ore had been mined and all development work phased out. As a result, when the State purchased the Konongo mine in 1965, there was no more than one month's supply of ore ready blocked out for mining! An immediate advance of £925,000 was required by the State Gold Mining Corporation to enable them to pay the wages bill and finance a preliminary examination of the property.

TABLE 7.9

KONONGO GOLD MINES. DIVIDEND PAYMENTS

Year		Amount (%)
1944-45/52-53	2s units	10% p.a.
1953-54		15
1954-55	2s units	5
	1s units	25
1955-56		25
1956-57		66 1/3
1957-58		50
1958-59		41 2/3
1959-60-61		25
1961-62/64-65		NIL

Source: Skinner's Mining Yearbook, 1963.

TABLE 7.10

KONONGO GOLD MINES SHARE QUOTATIONS

(Selected Years)

Year		Highest		Lowest	
		s	d	s	d
1960	2s units	2	4		11
1961		1	4		5
1962		1	4		4
1963		1	1		6
1964			8		4
1965		1	1		4

Source: Skinner's Mining Yearbook, 1966.

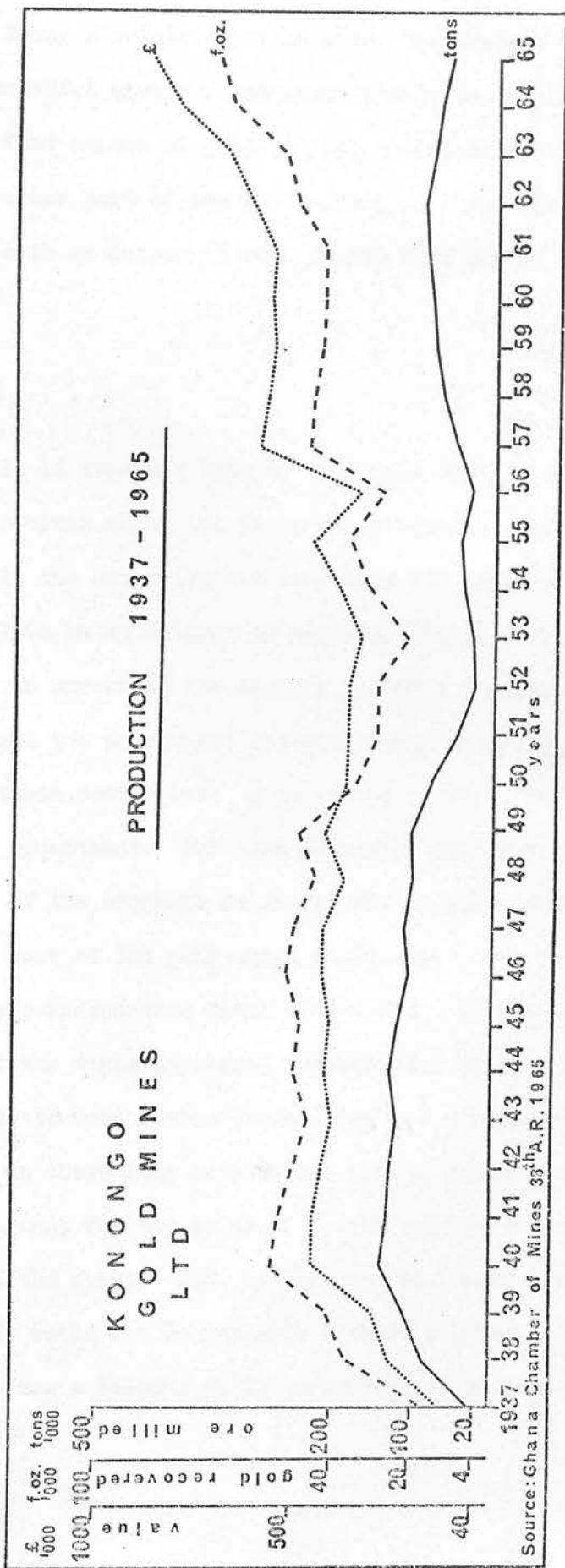


FIG 7.5

Being a relatively rich mine, the Konongo company had a fairly successful history, and from 1936-37 to 1964-65 it produced 1,291,564 fine ounces of gold, valued at £13,491,211 (Fig.7.5). Since it became part of the State group of mines, it has been a small producer, with an output of some 50,000 fine ounces of gold from 1965 to 1968.

CONCLUSION

It is apparent that by 1961 (and 1965 in the case of Konongo) none of the mines which the State inherited had good future prospects. Although all the companies had increased the scale of production in the late 1950s in an attempt to overcome rising costs, none was successful in arresting the decline in their profits. Dividends dwindled, and the poor share ratings quoted on the Stock Exchange reflected these conditions. Gold mining in Ghana was no longer an attractive investment. For some 80 years, gold mining had been a vital part of the economic fabric of the country, and the threat of closure of most of the gold mines posed social and economic problems for the newly-independent Ghana Government. It was against this background that the State purchased the marginal mines. The extent to which the State Gold Mining Corporation has maintained production and employment in these long-established mining communities, and earned foreign exchange for the economy, is the subject of the final three chapters of the study. But, before pursuing these lines of investigation, this chapter would not be complete without a brief note on the Ashanti mine, as it has a bearing on the geography of gold mining in Ghana.

COROLLARY : A NOTE ON THE ASHANTI MINE

Ashanti Goldfields Corporation Ltd. was registered in 1897, with an authorised capital of £250,000. The excellent development results achieved by the company justified raising fresh capital, which ultimately reached £3,000,000 issued in 15,000,000 shares of 4s each. Its continued future prosperity was underlined when Lonrho Ltd. bought the Ashanti mine in January 1969 for £15,000,000. The concession areas cover 100 square miles in the districts of Bekwai and Adansi, in the Ashanti region, and the mine is centred on the Obuasi township, some 120 miles by rail from Takoradi.

The gold-bearing reefs are well-defined and have proved to be immensely rich. The producing section of the mine extends over 12,000 feet of strike and is served by six main surface shafts. Although the ore is by far the highest grade of all the gold deposits in Ghana, working costs tend to be very high because of the complexity of the metallurgical methods required to treat the ore, and in particular the difficulties of obtaining a constant ore mix in the mill which treats both free-milling gold from the quartz bodies, and gold locked up in sulphide ores. In this context, it is worth noting that the 'cut-off' grade in the Ashanti mine is no less than 12 dwts per ton, which is nearly three times the average grade of ore mined by the State group! The modern treatment plant which was commissioned in 1947 was designed with an eventual capacity of 50,000 tons per month. The new owners plan to expand the capacity of the mine still further to some 80,000 tons per month. Timber for the mine is obtained from the Corporation's timber concessions, and the company carries out reafforestation within its concessions; to 1966, over 5000 acres had been replanted.

TABLE 7.11

ASHANTI GOLDFIELDS CORPORATION, LTD. DIVIDEND PAYMENTS

(Selected Years)

Year	Amount(%)	Year	Amount(%)
1900-01	100	1923	NIL
1901-02	50	1924	20
1902-03	25	1925	17½
1904-05	50	1937-38-39	95
1905-06-07	NIL	1950	62½
1907-08	10	1951-52	50
1908-09	NIL	1953-54	40
1910	50	1955	20
1911	75	1956	35
1912-13	87½	1957	25
1914-15	68½	1958	62½
1916	70	1959	50
1917-18-19	75	1960	54 1/6
1920	62½	1961	25
1921	20	1962	50
1922	25	1963-64-65-66	37½
		1967	29 1/6

Source: Skinner's Mining Yearbook, annual 1901-1968

TABLE 7.12

ASHANTI GOLDFIELDS CORPORATION, LTD. SHARE QUOTATIONS

(Selected Years)

Year		Highest		Lowest	
		s	d	s	d
1917	4s units	22	6	15	-
1918		22	1½	18	-
1919		25	6	20	-
1923		12	1	6	6
1924		12	9	6	-
1925		14	4	11	-
1937		81	10	53	9
1938		84	8	51	7
1939		85	-	56	-
1960		25	3	12	9
1961		13	6	8	2
1962		11	7	7	1
1963		15	9	9	7
1964		13	6	6	7
1965		9	4	5	6
1966		12	3	5	10
1967		13	3	8	10

Source: Skinner's Mining Yearbook, 1920, 1926, 1940 and 1968.

TABLE 7.13

ASHANTI GOLDFIELDS CORPORATION, LTD.GENERAL STATISTICS FOR THE YEAR ENDING 30 SEPTEMBER 1966

<u>1. PRODUCTION</u>		
Short tons treated, dry	498,445	
Grade milled, dwts/ton	20.47	
Gold produced, fine ounces	459,617	
Recovery, per cent	90.08	
Development footage	56,084	
Shaft sinking, feet	511	
<u>2. FINANCE (Sterling)</u>		
Revenue per ton treated	232s 5d	
Working cost/ton (excl.devt)	103s 10d	
Development cost/ton	13s 5d	
Proceeds from sales of bullion		£5,790,964
Sundry revenue		<u>174,146</u>
Total revenue		£5,965,110
Mining costs	<u>£2,920,939</u>	
Pension scheme, General		
Expenses-London, Bullion		
Realisation charges,		
Depreciation	£ 487,380	<u>£3,408,319</u>
		<u>£2,556,791</u>
Ghana Minerals Duty and		
Royalty, Ghana Taxes and		
U.K. Taxes		<u>£1,777,886</u>
Balance available for		
distribution	=	<u>£ 778,905</u>
<u>3. ORE RESERVES, at 30 Sept.1966, were:</u>		
3,673,760 tons of ore containing		
3,638,663 fine ounces of gold at a grade of		
19.81 dwts per ton.		

Source: By permission of the Acting Mines Manager, A.G.C.,
Ltd., Obuasi.

Throughout its history, the Ashanti mine has proved the most consistently profitable gold mining enterprise in the country, and high dividends have rewarded its shareholders, although since the second world war, in common with all other gold mining companies, dividend payments have declined as rising costs squeezed profit margins (Table 7.11). The share quotations on the Stock Exchange have suffered a similar downward trend (Table 7.12), although when Lonrho's takeover bid was announced, Lonrho's shares doubled in value for a short time early in 1969, reflecting the high value the market attached to their acquisition of the Ashanti mine.

From 1897 to 1966, Ashanti Goldfields Corporation produced over 10,000,000 ounces of gold, valued at nearly £100,000,000, and its future seems assured for many decades. Table 7.13 illustrates the performance of the company in a typical year. It demonstrates the positive balance achieved by the company, but it should be noted that although the gross profits are high, and ore reserves stand at a high level, the net profits are low, largely owing to the high burden of taxation borne by the company. The performance of the State mines is therefore placed in perspective against Ashanti's outstanding record of past and continuing profitability, and it is against this background that the operations of the State Gold Mining Corporation are analysed in Chapters 8, 9 and 10 of the study.

CHAPTER 8

THE PERFORMANCE OF GOLD MINING:
A COMPARISON PRE- AND POST-TAKEOVERINTRODUCTION

As was shown in Part II of the study, the gold mining industry in Ghana grew and developed in the hands of private companies, registered abroad, and financed by foreign capital. When the State entered this field of economic activity in 1961, the structure of ownership was fundamentally changed. The Ghana Government's purchase of the marginal gold mines was based on economic and social grounds: to maintain output and employment in these long-established mining communities. It is the purpose of this chapter to examine the trends in production over the period 1956-1967 with a view to assessing how far the economic objective behind the takeover has been fulfilled.

The economic significance of keeping open the marginal mines is related to the high external value of gold to the economy. Ghana's export trade, not unlike that of many of the developing countries, is essentially based on primary products. Eight commodities of primary origin account for over 98% of the value of Ghana's exports (Table 8.1). Although gold comprised less than one-tenth of the value of exports in 1960, it was the third most important earner of foreign exchange, after cocoa, timber and their derivatives. Traditionally, gold has taken second place to cocoa, but its share of the country's export trade has declined, particularly since the second world war (Table 8.2). But, unlike other primary products, gold does not suffer the fluctuations in demand, price or value characteristic of Ghana's other export items. Under conditions of prosperity or recession, and in the face of

TABLE 8.1

COMPOSITION OF EXPORTS OF DOMESTIC PRODUCTS, 1960

Commodity	Value £'000,000	%Total value of exports
Cocoa beans and products	67	59.7
GOLD	11	9.7
Timber (logs)	10	9.1
Timber (sawn)	5	4.8
Diamonds	9	8.6
Manganese	6	5.6
Bauxite	0.5	0.5
Cola nuts	1	1.1
Others	2	1.7
	£114,000,000	100%

Source: Economic Survey, 1961, Tables 102 and 103.

TABLE 8.2

% DISTRIBUTION OF EXPORTS: SELECTED YEARS

	1931	1938	1948	1962	1969
Cocoa	59.0	40.9	77.0	60.0	68.0
GOLD	11.0	43.7	10.5	10.1	8.5
Timber	0.7	0.7	4.5	11.0	9.0
Diamonds	5.0	4.9	1.8	6.6	6.3
Manganese	4.0	8.2	4.9	4.9	2.0
Bauxite	-	-	0.5	0.6	0.7
Others	25.3	1.6	0.8	6.8	5.5
	100%	100%	100%	100%	100%

Source: Annual Export Statistics.

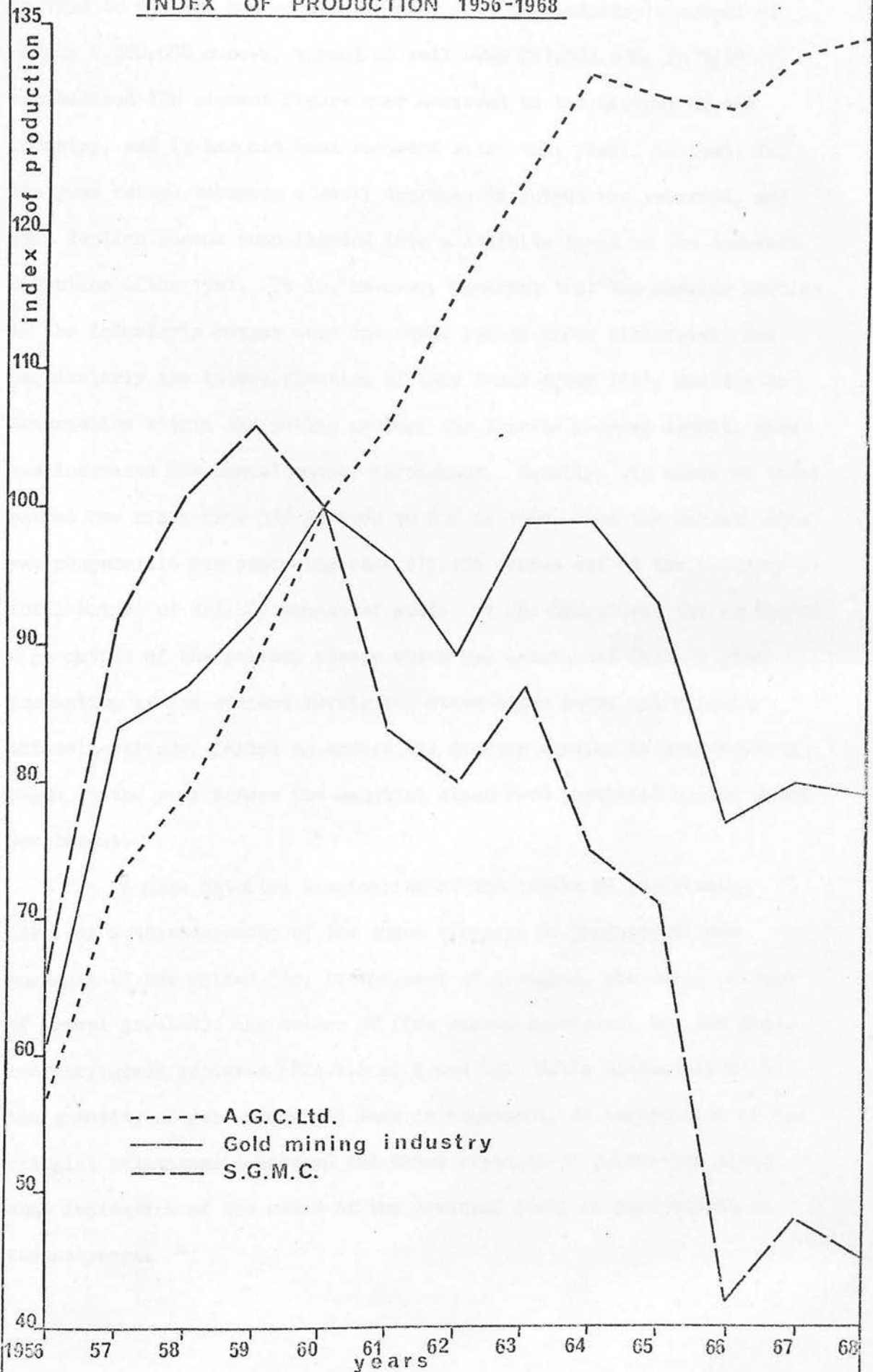
technological change, the demand for gold and the price that the world is willing to pay never abates. It is this fundamental stabilising quality which makes gold an important source of regular and reliable revenue, provided that output can be maintained. In these terms, the closure of the marginal mines in 1961 would not only have meant the loss of revenue of some £10,000,000 per annum, but would also have left the Ghanaian economy even more dependent on a range of exports with a volatile market.

Under State ownership, there is the additional advantage that proportionately more foreign exchange is fed back into the economy than when the mines were privately-owned, since a substantial part of the revenue from the sales of gold was formerly repatriated. It has been calculated that in 1961-62, some 80% of the net proceeds from the sale of gold was converted to foreign exchange earnings by the State mines, which compared with some 65% of the revenue of the private sector, which in fact showed a 23% higher gross value on the sales of gold in that year (Birmingham et al., 1966, p.263). With these general considerations in mind, the performance of the gold mining industry will be examined, starting with a general survey of the trends in production over the period 1956-1967, and followed by a more detailed analysis identifying the reasons for those trends.

TRENDS IN PRODUCTION : 1956-1967

The secular trend in the physical output of the gold mining industry in Ghana from the 1950s has been downward (Fig.8.1). Within this general trend, two contrasting periods can be distinguished and these correspond closely to the pre- and post-takeover periods. From 1956 to 1960, output increased by some 63%, from 562,445 ounces of gold

GHANA GOLD MINING INDUSTRY
INDEX OF PRODUCTION 1956-1968



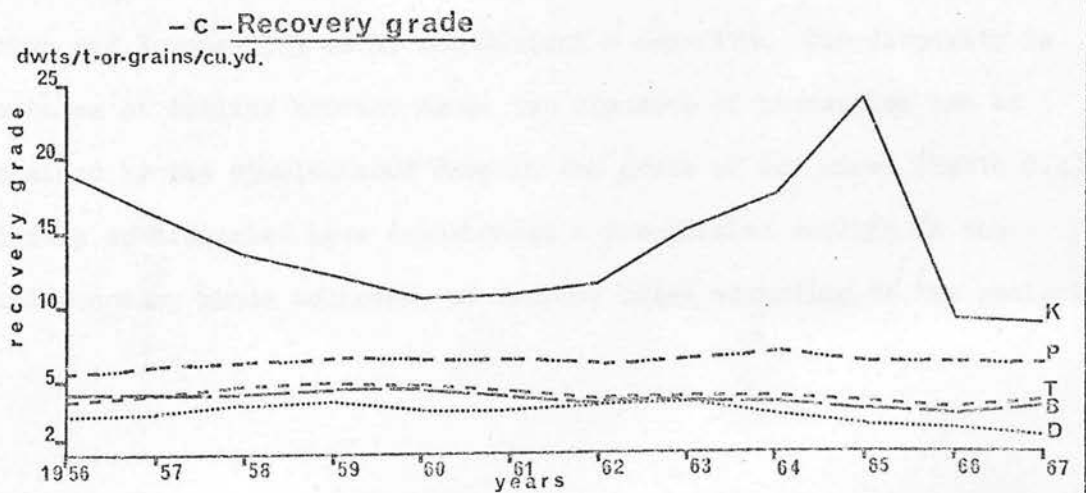
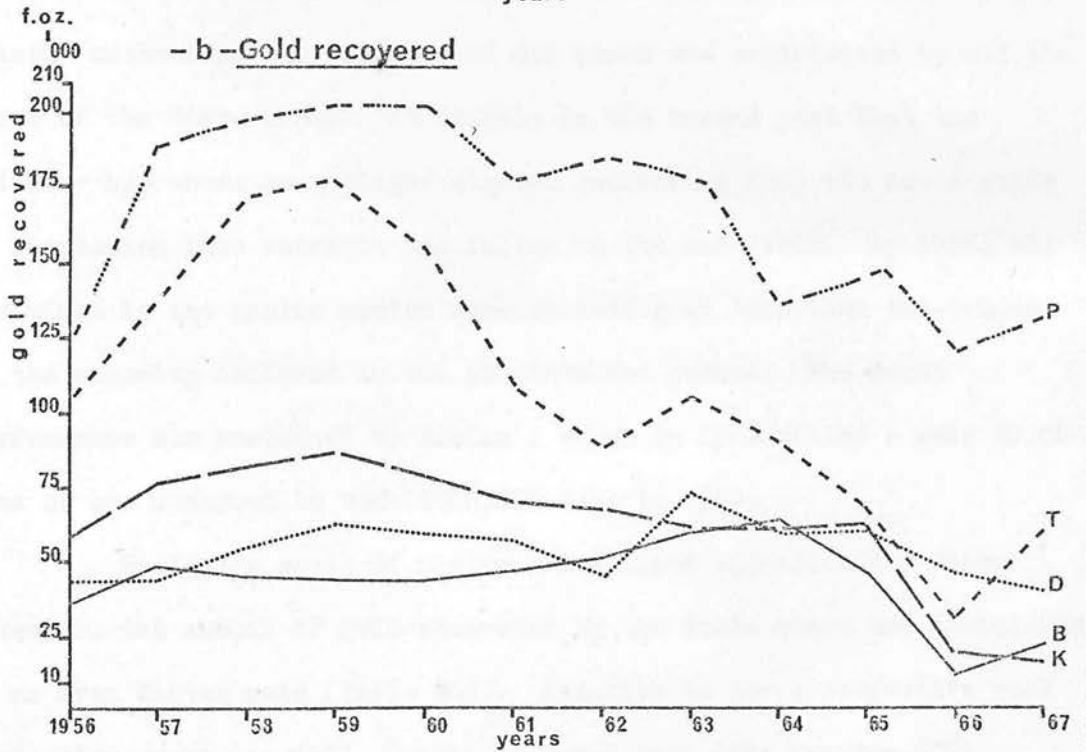
Source: S.G.M.C. & A.G.C. Ltd.

FIG 8.1

in 1956 to 915,317 ounces of gold in 1960. The industry's output of nearly 1,000,000 ounces, valued at well over £11,000,000, in 1960 represented the highest figure ever achieved in the history of the industry, and it has not been recorded since that year. In fact, in the year before takeover a small decrease in output was recorded, and this decline became consolidated into a definite trend in the downward direction after 1961. It is, however, apparent that the secular decline in the industry's output over the whole period under discussion, and particularly the intensification of this trend after 1961, was due to contraction within the public sector; the privately-owned Ashanti mine has increased its annual output throughout. Equally, its share of total output has risen from 39% in 1960 to 65% in 1968, when the Ashanti mine was responsible for producing some 478,428 ounces out of the industry's total output of 727,809 ounces of gold. It is, therefore, the continued high output of the private sector which has maintained Ghana's gold production at its current level; the State mines have, individually and collectively, failed to arrest the drastic decline in output which began in the year before the marginal mines were purchased by the Ghana Government.

A more detailed examination of the trends in production involves a consideration of the three elements of production: the tonnages of ore milled (or, in the case of dredging, the cubic yardage of gravel treated); the number of fine ounces recovered; and the final recovery grade achieved (Fig.8.2 a, b and c). While ultimately it is the quantity of gold recovered that is important, an examination of the changing relationship between the three elements of production gives some indication of the cause of the downward trend in gold output in recent years.

STATE MINES PRODUCTION 1956-1967



The scale of operations, as expressed by the tonnages of ore milled, on the State mines has shown a marked reduction in the 1960s. Each subsidiary had attained its maximum scale of mining by the turn of the decade: Tarkwa and Bibiani in 1959; Prestea in 1960; and Konongo in 1961. Only the dredging subsidiary continued to expand its scale of annual throughput until 1965, after which the annual yardage of gravel treated has dropped. But, since it operates under a completely different set of conditions, its performance in this respect is not strictly comparable with that of the deep-level mines. In the first two years after takeover, a slight increase in the scale of mining was achieved over the 1960 level, but this could not be maintained and after 1963 a drastic cutback in the tonnages of ore mined was experienced by all the mines of the State group. It is only in the recent past that the industry has shown some slight sign of recovering from the acute state of depression into which it had fallen in the mid-1960s. By 1968, all the mines in the public sector were operating at less than two-thirds of the capacity achieved in the pre-takeover period. The worst performance was sustained by Bibiani, which in 1968 milled a mere 58,000 tons of ore compared to some 4000,000 tons in 1959.

While the scale of mining has dropped significantly since takeover, the amount of gold recovered by the State mines has diminished at an even faster rate (Table 8.3). Relative to their respective peak production years, in 1968, Dunkwa produced only 64%; Prestea 60%; Tarkwa and Konongo 33% each; and Bibiani a mere 11%. The disparity in the rates of decline between these two elements of production can be explained by the simultaneous drop in the grade of ore mined (Table 8.4). All five subsidiaries have experienced a progressive decline in the final recovery grade achieved, at varying rates according to the geological

TABLE 8.3

TRENDS IN PRODUCTION : STATE MINES
1968 OUTPUT COMPARED WITH PEAK YEAR

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
	tons		tons	%	oz.		oz.	%
Tarkwa	755,229	1959	328,525	51	178,464	1959	54,857	33
Prestea	623,822	1960	400,510	66	204,969	1959	118,095	60
Bibiani	404,527	1959	58,537	15	86,075	1959	10,126	11
Konongo	90,020	1961	38,339	40	65,607	1964	18,377	33
Dunkwa*	12,780,900	1965	8,841,500	66	73,838	1963	47,932	64

(a) Maximum tonnage mined.

* Cubic yardage dredged.

(b) Year.

(c) Tonnage mined in 1968.

(d) 1968 tonnage as % peak year.

(e) Peak gold output.

(f) Year.

(g) 1968 gold output.

(h) 1968 gold output as % peak year.

Source: S.G.M.C.

TABLE 8.4

TRENDS IN GRADE RECOVERED : STATE MINES
1968 GRADE COMPARED WITH PEAK YEAR

	Maximum grade	Year	1968 grade	% drop over peak year
	dwts/ton		dwts/ton	
Tarkwa	4.7	1959	3.3	30
Prestea	6.7	1959	6.1	8
Bibiani	4.6	1960	3.5	24
Konongo	24.0	1964	9.6	65
Dunkwa*	3.6	1963	3.1	24

* grains/cubic yard.

Note: 1 dwt(pennyweight) = 1/20th of an ounce.
1 grain = 1/480th of an ounce.

Source: S.G.M.C.

dictates of the ore-bodies worked. None of the State mines is endowed with rich ore-bodies, and of the deep-level mines only Konongo can be classed as a medium-grade property, the others being low-grade. By 1967, it required 5 tons of ore to yield one ounce of gold at Tarkwa; at Bibiani 6 tons; at Prestea 3.5 tons; and at Konongo, the richest mine, 2 tons. By contrast, the Ashanti mine contains very high-grade ore-bodies, and on the average one ounce of gold can be recovered from one ton of ore. Within this mine there are occasional lenses of exceptional value, such as the 1274 fissure (location 12 level, position 74 cross-cut) in the Ayeinm section; this particular section yields at least 50 ounces to the ton, and is locally referred to as the "money box" !

Since the grade of ore mined has declined over the period under discussion concomitant with a reduction in the tonnage of ore milled, the quantity of gold produced has been limited by both these factors. The drop in grade would not be so significant in itself had tonnages been maintained at a higher level, but with the decline in the extraction rate, the simultaneous decline in the recovery grade has exacerbated the problem. Revenue has been depressed as a result. In this context, it is noticeable that any increase in the scale of operations tends to produce a higher recovery grade. For example, in the pre-takeover period, the expanded scale of production was accompanied by an increase in the final recovery grade, and conversely, after takeover, the reduced scale of mining led to a significant drop in the final recovery grade of several pennyweights per ton of ore milled. It is a well-established axiom of mining economics that the desired 'cut-off' grade can be achieved through economies of scale where the average grade of ore mined is low. This is a particularly relevant concept in respect of low-grade properties, whose unit overheads are as high as those of higher grade

properties, but whose unit return is considerably less. In such circumstances, large-scale mining operations must be adopted to achieve economies and the desired level of profits. This the State mines have been unable to do. Consequently, since takeover, not only has revenue declined but substantial losses have been sustained.

From this general survey of the performance of the gold mining industry in Ghana over the period 1956-1967, three trends can be identified: the pre-takeover increased scale of production, 1956-1960; the post-takeover reduced scale of mining, 1961-1967; and the contrasted performance of the public and private sectors, 1961-1967. The rest of this chapter is devoted to a discussion of the factors responsible for these trends.

PRODUCTION 1956-1960 : STIMULI

The increased scale of mining operations adopted by all the companies in the late 1950s was a direct response to the pressure of rising costs. The initial and most important stimulus to the adoption of this policy was the award of a 10% wage increase to all daily-rated labour as the result of a three-month strike, from November 1955 to February 1956, in support of wage claims. The cost to the mining industry of this award was of the order of £500,000, and this increase could only be borne by stepping up production as a means of achieving a higher gold output to pay for the increased labour costs. At the same time, the companies had to somehow redress the losses of revenue sustained during the period of the strike. For example, Amalgamated Banket Areas Ltd. lost some £450,000 of gold revenue during the strike, and it cost the company some £150,000 to keep the mine open during the three-month period. In addition, several working places had falls of

the hanging wall and required extensive retimbering once operations were resumed. What little surplus capital was available, since profits had been dwindling steadily since the second world war, was devoted to this cause. Secondly, the Government came to the rescue of the marginal mines by giving them financial assistance to cushion the full impact of the wage increases of 1956. Some £200,000 was distributed to four of the marginal mines, and this sum was spread over two years. Although the amount of aid was small, it did enable the mines to expand their scale of operations, so that after the aid ceased, the higher level of production which it permitted could be maintained from the industry's own resources. Mechanisation was adopted wherever possible, particularly on the low-grade mines, to raise the level of labour productivity and achieve further economies.

However, despite all the efforts to offset the cost inflation, the 'ceiling' was apparently reached in 1959-60, and no further increases in the tonnages of ore mined could be achieved, largely owing to the low level of ore reserves, which inevitably limited further scale increases. In addition to the dwindling ore reserves, working costs had continued to rise with further wage increases in 1958 and again in 1960. The Minimum Remuneration Instrument of 1960 meant for the mining industry the payment of an additional 1s 3d per day to all daily-rated labourers to bring wages in the industry in line with the statutory national minimum daily wage of 6s 6d. This came as the final blow to the marginal mines; since 1956 working costs had risen at a faster rate than returns on the sale of gold (Table 8.5).

TABLE 8.5

PERCENTAGE INCREASES IN PRODUCTION AND WORKING COSTS:
1956-1960

	%Increase tons mined	%Increase gold output	%Increase working costs
Tarkwa	10	47	42
Prestea	15	70	45
Bibiani	14	41	43
Konongo	15	30	40
Dunkwa	30	24	26

Source: S.G.M.C.

Neither physically nor financially were the mines able to effect further scale increases; both ore reserves and capital reserves were too low to permit it without additional Government support. Instead of extending further financial assistance to the industry, the Ghana Government chose the alternative of offering to purchase the assets of five of the seven surviving companies.

PRODUCTION 1961-1967 : CONSTRAINTS

The post-takeover decline in production was therefore to some extent foreshadowed by the diminishing returns experienced by the former private companies in the last year of operations. However, the sequence of events leading up to takeover do not explain the magnitude of the fall in output since 1961, nor the marked intensification of the downward trend from 1963. The evidence suggests that the steep rate of decline in production sustained by the State mines after takeover can be attributed to two main factors, the lack of production inputs and the lack of adequate ore reserves.

1. The Lack of Production Inputs

Production inputs are taken to mean physical inputs in the form of stores, supplies and spares. There is an intimate relationship between the availability of production inputs and the capacity of any enterprise to function; any shortage or restriction in the flow of inputs will depress production.

When the Ghana Government bought the marginal mines in 1961, all ties with the former owners' supply organisation were broken. A central ordering department and a central store and distributing point was established at Tarkwa, the headquarters of the State Gold Mining Corporation. The aim of centralisation was to achieve economies through bulk ordering. At first, all supplies for the State mines were commissioned through a Government Agency, the Government Supply Commission, which dealt with all state enterprises in this respect. The mines had therefore to compete with other productive industries in the public sector for an allocation of foreign exchange to buy its materials. This proved to be a most inadequate system since the Commission ran short of funds and this led to protracted delays in the payment of bills to overseas suppliers. Confidence abroad was lost and it became increasingly difficult for the State mines to obtain the delivery of essential stores. In addition, the terms of the Exchange Control Act of 1960, and the ever-tightening import licence regulations exacerbated the problem. The Government's intention to restrict foreign exchange spending to the barest essentials weighed particularly heavily on the gold mining industry, since the import-content of output is high, estimated at some 10% (Birmingham et al., 1966, p.72).

In February 1966, an Economic Committee was set up and all the outstanding bills were paid off. From that time, each State enterprise

has controlled its own ordering system. The State Gold Mining Corporation now deals directly with the suppliers, through a London-based secretary. However, it is apparent that the supply organisation is still not working as smoothly or efficiently as it did formerly. All the mine managers agreed unanimously that the long delays between sending the initial acquisition lists to headquarters and taking delivery of the items ordered is still one of the main constraints on production. Similarly, the lack of a technically-qualified representative at the supply end to check the items before they leave for Ghana is regarded by all the mine managers as a major weakness in the system. Equally, while they all accept the theoretical value of a centralised supply organisation, it is generally felt that in practice the system is a failure. All the mine managers emphasised the difficulty they experience in having their acquisition lists approved immediately; it is more common for some weeks or even months to elapse, as query upon query arrives from headquarters before orders are eventually placed. The stultifying effect of this on production cannot be over-emphasised, as the following analysis of production patterns at each State subsidiary will show. It is suggested that the problem can best be described by examining the production of each mine in some detail using the quarterly reports for the period June 1965 to December 1967. These dates are chosen because formerly the State Gold Mining Corporation prepared only annual returns and these barely illustrate the trends except at a general level. The quarterly reports cover not only the actual output achieved by each subsidiary, but also include the budget estimates for each quarter; this allows a comparison of performance, projected and realised. The projected targets for each quarter were based on the assumption that normal conditions would prevail and that a continuous flow of production inputs would be assured.

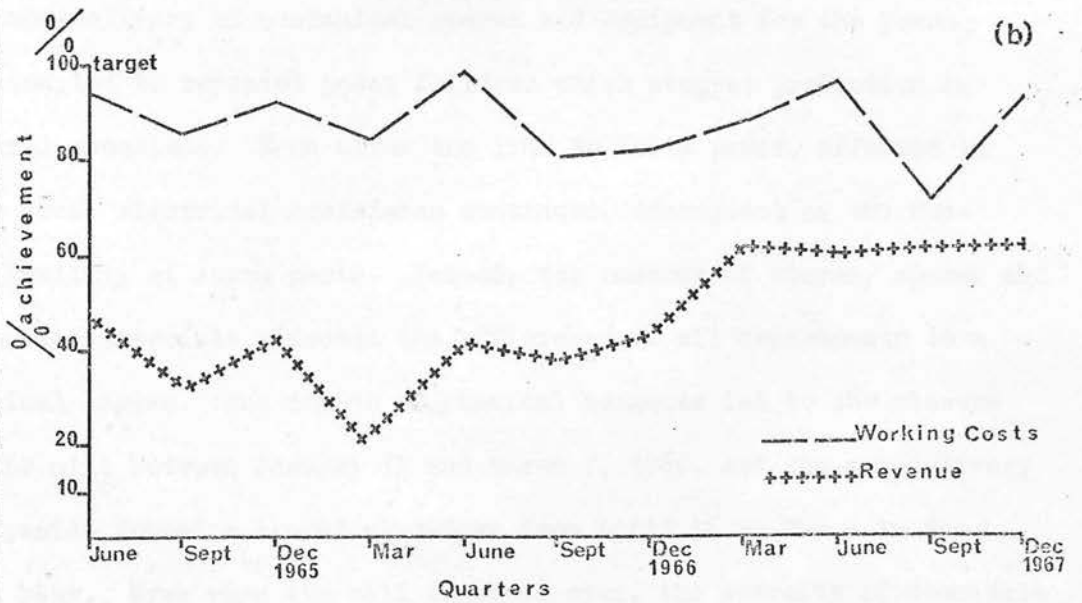
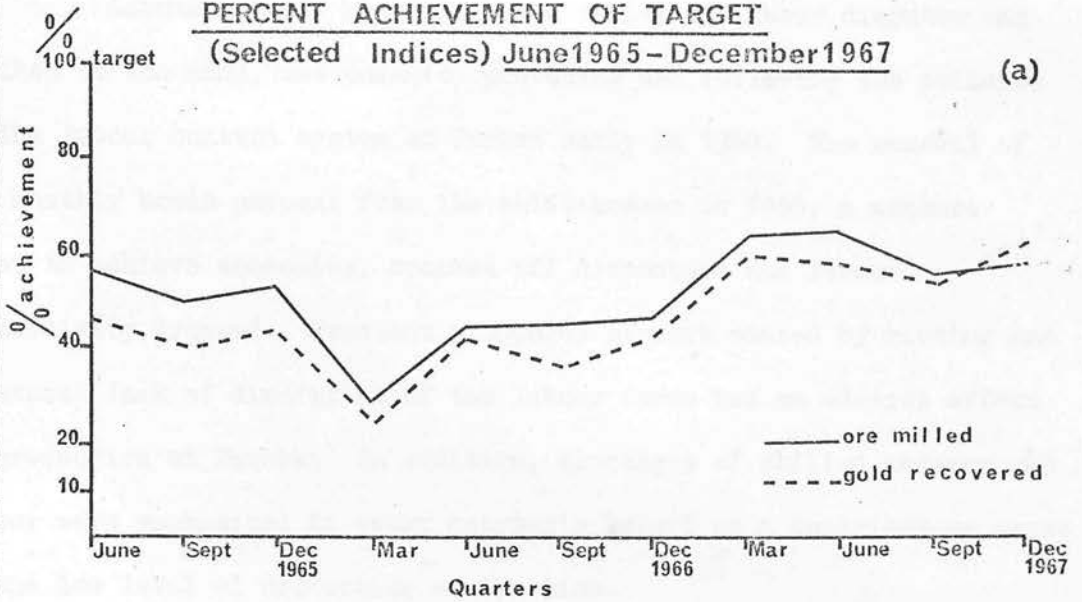
(i) Tarkwa Goldfields

In every single quarter, June 1965 to December 1967, Tarkwa consistently failed to fulfil the planned production targets (Fig.8.3a). The tonnages milled, the quantity of gold produced and the final recovery grade achieved were all substantially less than had been expected. The most important effect of the low level of production achieved relative to the target set for Tarkwa was that while working costs were not as high as had been budgeted, revenue was markedly lower than expected (Fig.8.3b). The savings in working costs were not in proportion to the drop in revenue.

Throughout the period under discussion, Tarkwa goldfields achieved no more than just over half the tonnages that were expected. In no quarter was the target even near being met; the best performance in the quarter ending March 1967, at 65% of target, was still under three-quarters of the planned milling rate of 120,000 tons for that quarter. The acute depression experienced by the State mines in the mid-1960s is well illustrated by Tarkwa's poor performance in the quarter to March 1966, when a mere 30% of target was attained. The quantity of gold recovered stood at even lower levels relative to target throughout the whole period, in the range of 25% to 62%. Over the eleven quarters, Tarkwa produced under half the amount of gold that had been expected. Consistent with the target tonnages per quarter, which varied between 105,000 and 162,000 tons, it was estimated that the final recovery grade should be in the range 3.35 to 4 dwts per ton. But, in fact, Tarkwa's final recovery grade over the period varied in the lower range of between 1.74 and 3.82 dwts per ton. This accounts for the disparity between projected and actual revenue.

TARKWA GOLDFIELDS

PERCENT ACHIEVEMENT OF TARGET (Selected Indices) June 1965 - December 1967



Source: S.G.M.C. unpublished

FIG 8-3

There were several reasons for the low level of output of Tarkwa goldfields, and two main sources of constraint can be identified: labour problems and the difficulty of obtaining supplies.

Labour unrest, resulting in a series of labour disputes and strikes on the mine, was endemic, preceding and following the collapse of the labour control system at Tarkwa early in 1968. The removal of the monthly bonus payment from the shift-bosses in 1965, a measure taken to achieve economies, sparked off discontent and labour productivity dropped. Frequent stoppages of work caused by rioting and a general lack of discipline of the labour force had an adverse effect on production at Tarkwa. In addition, shortages of skilled underground labour were emphasised in every quarterly report as a contributory cause of the low level of production at the mine.

Secondly, there was a shortage of drill steels which began to affect production in 1964, since underground operations were hindered. The non-delivery of mechanical spares and equipment for the power station led to repeated power failures which stopped production on several occasions. Even after the link to Volta power, effected in June 1966, electrical breakdowns continued, consequent on the non-availability of spare parts. Indeed, the rundown of stores, spares and essential materials affected the efficiency of all departments to a critical degree. The dearth of chemical reagents led to the closure of the mill between January 12 and March 7, 1966, and the non-delivery of cyanide forced a second shut-down from April 16 to May 8 in the same year. Even when the mill remained open, the scarcity of chemicals led to reduced metallurgical efficiency. It was not until the first quarter of 1968 that the essential stores, on order for over three years, arrived. The restricted flow of production inputs, on whose

assumed arrival the forecasts for production had been based, therefore accounts for the wide divergence between production targets and achievement at Tarkwa goldfields, and the gradual intensification of labour difficulties throughout the period exacerbated the situation by adding to the number of lost workdays.

(ii) Prestea Goldfields

A similar set of constraints operated at Prestea, although on the average the mine had a better record of production over the period (Fig.8.4a). As a result, the disparity between the budget estimates and the actual returns was much less pronounced (Fig.8.4b).

The quarterly milling rate achieved at the Prestea mine never fell below three-quarters of the target for any one quarter; it was maintained in the range 76% to 91% of target. Its aggregate accomplishment, in terms of the tonnages mined, was some 30% higher than Tarkwa's over the eleven quarters. The quantity of gold recovered was similarly higher than Tarkwa's relative to target, in the range 67% in the quarter ending September 1965 to 90% in the last quarter of 1966. This nevertheless represented a disproportionate loss of gold to tonnage milled, so that revenue was only some 75% of the expected earnings of the mine over the period. Savings in working expenditure from the reduction in the scale of operations were also small relative to the loss of projected revenue. The gold-bearing quartz deposits at Prestea assay higher than the blanket ores at Tarkwa, and so the expected recovery grade at the mine, based on geological inference and sampling tests, was set in the higher range of 6.60 to 7.12 dwts per ton. This forecast was based on a quarterly extraction rate of between 99,000 and 135,000 tons, but, since these tonnages were not achieved, the final recovery grade averaged between 4.77 and 6.56 dwts per ton.

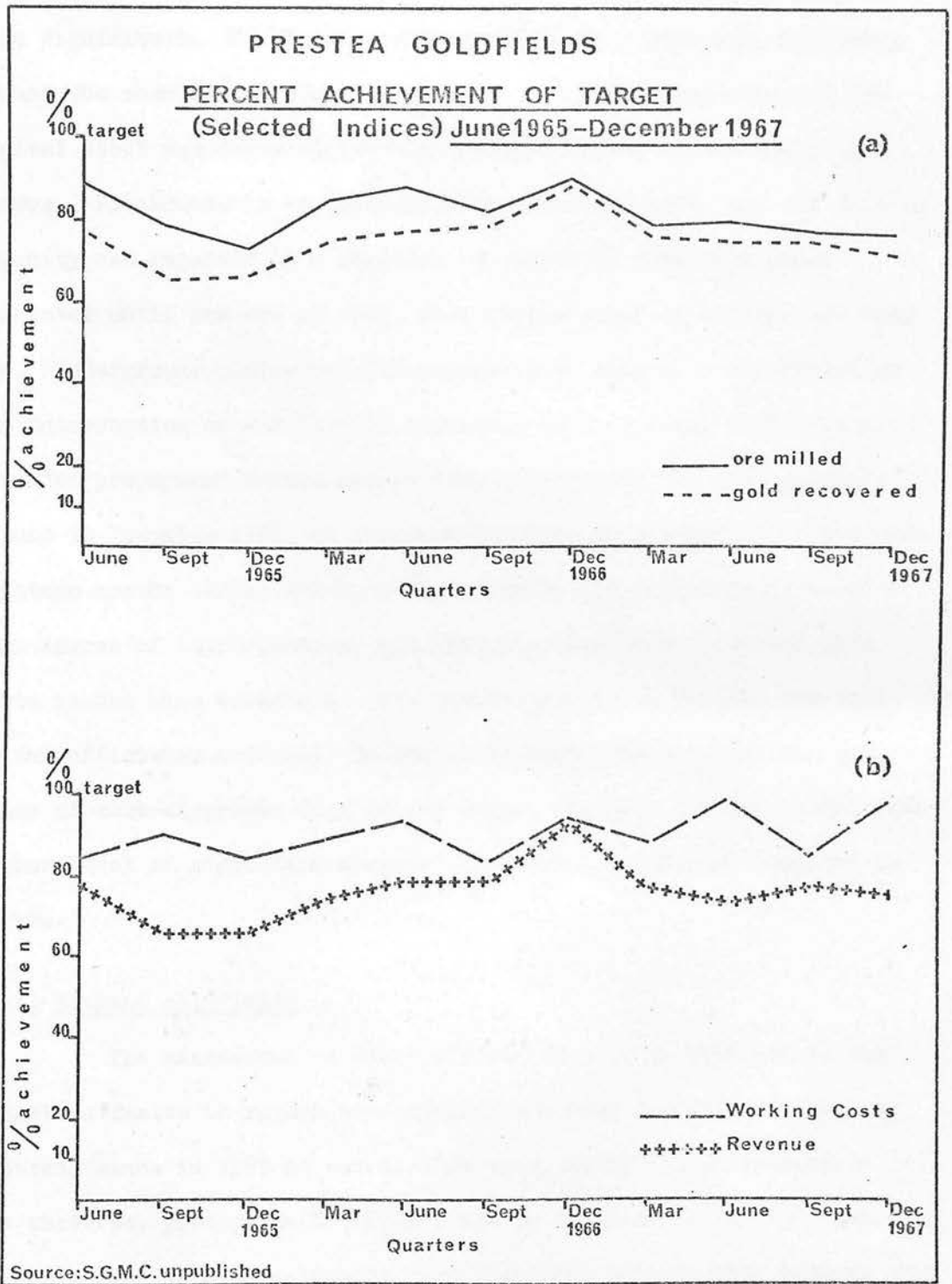


FIG 8.4

The main reasons for Prestea's low level of output are similar to those described for Tarkwa, although labour difficulties were less significant. Prestea's problems were mainly physical, revolving around the shortage of production inputs. A large proportion of the capital stock was rendered immobile because of the non-delivery of spares. Breakdowns in the milling plant were frequent, and the milling capacity was impaired by a shortage of essential chemicals which persisted until the end of 1967, when copper sulphate stocks were very low. Underground mining and development work were also restricted by the interruption of the flow of materials from overseas suppliers who demanded prepayment before orders were dispatched. In the quarterly report to December 1965, it was recorded that development work was some eighteen months behind schedule as a result. The situation demanded a high degree of improvisation, and attempts were made to manufacture parts in the mine workshops. The entire production process was held up and efficiency reduced. On the other hand, the relative insignificance of work-stoppages from labour unrest explains to some extent the higher level of production achieved by Prestea goldfields compared to Tarkwa.

(iii) Bibiani goldfields

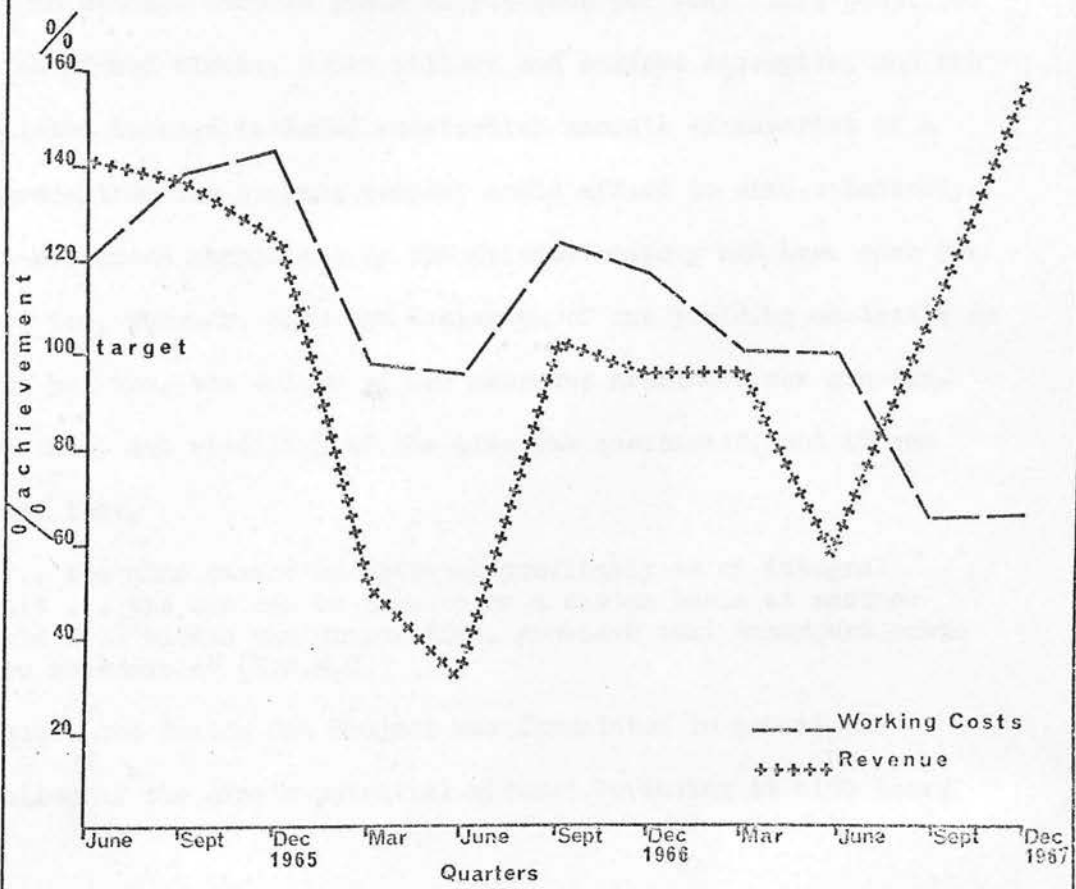
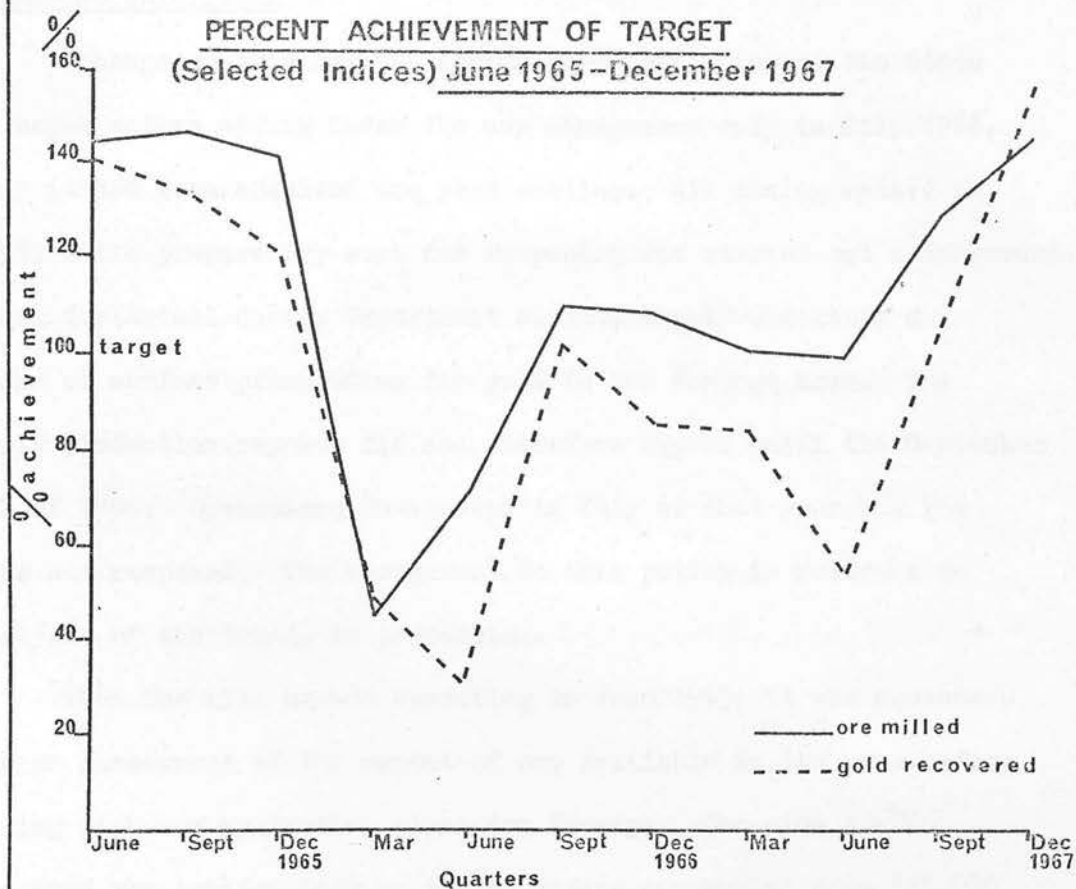
The assessment of Bibiani's performance in relation to the budget estimates is rather more complicated than for either Tarkwa or Prestea, since in 1965 it was decided that, owing to the exhaustion of ore reserves, production at Bibiani was to be gradually scaled down to closure. The quarterly targets were therefore continuously reduced from 52,000 tons to some 16,000 tons during the period under discussion. Thus, in the case of Bibiani, the targets were no more than guidelines, since precise forward estimates of production were complicated by the

scattered distribution of the several remnant blocks of ore left to mine.

An examination of Fig.8.5a and b would tend to suggest that Bibiani's performance was remarkable compared to the previously described low level of production of its sister mines, since in eight quarters Bibiani produced much more than expected. This is more apparent than real, however, because not only did production in absolute terms decline very markedly at Bibiani from 1965, but the cost of mining was abnormally high relative to the revenue earned. For example, in 1967, it cost almost £35 to produce one ounce of gold, valued at 35 dollars! The cost of phasing out the mine, therefore, puts its performance into true perspective, and, for comparative purposes, Fig.8.5a and b must be read with that qualification in mind. The bizarre pattern of achievement over target in the range of 30% to 156% in respect of tonnages milled, and from 45% to 147% in respect of gold recovered is meaningless for comparative purposes without a fuller knowledge of the conditions at the Bibiani mine at this period. In fact, the only value of the graphical representation of the quarterly statistics for Bibiani is that the steep trough noted in the nine-month period between September 1965 and June 1966 brings out very clearly the time of greatest shortage of stores and spares. The mill at Bibiani was forced to close down for some weeks during this period. By the middle of 1967, there were only twelve blocks of ore left in the mine, and these varied in dimension and gold content and were located at different sections within the mine. The abnormally high cost of production was inevitable in light of the scattered distribution of the remaining pockets of mineable ore. It is in these terms, therefore, that Bibiani's performance over the period should be understood. The lack of production inputs at Bibiani merely served to delay the phasing-out operation.

BIBIANI GOLDFIELDS

PERCENT ACHIEVEMENT OF TARGET (Selected Indices) June 1965 - December 1967



Source: S.G.M.C. unpublished

FIG 8.5

(iv) Konongo Goldfields

Konongo goldfields, the fourth deep-level mine of the State group, began active mining under the new management only in July 1966, although it had been acquired one year earlier. All mining ceased in June 1965 while preparatory work for reopening was carried out underground. The Ghana Geological Survey Department simultaneously undertook a programme of surface prospecting for gold in the Konongo area. The quarterly production reports did not therefore appear until the September quarter of 1966. Operations re-started in July of that year but the mill was not reopened. The background to this policy is relevant to the analysis of the trends in production.

When the mill ceased operating in June 1965, it was necessary to make an assessment of the amount of ore available in the mine before proceeding with any production plans for Konongo. The mine staff recalculated the tonnage left by the departing company at some 125,000 tons at an average sampled grade of 9.5 dwts per ton. This comprised ore in abandoned blocks, drive pillars and surface stockpile, and the recalculated tonnage included substantial amounts of material of a lower grade than the private company could afford to mine. Latterly, the cut-off grade maintained by the private company had been some 10 dwts per ton, whereas, with the inclusion of ore yielding as little as 4.5 dwts per ton, the volume of ore reserves available was greater. Despite this, the viability of the mine was questioned, and it was concluded that,

" ... the mine cannot be operated profitably as an integral unit ... the ore can be treated on a custom basis at another gold mill within the Corporation, provided that transport costs are reasonable" (S.G.M.C.)

In essence, the Custom Ore Project was formulated to permit the exploration of the mine's potential without burdening it with heavy

milling costs, for the mine did not have the capacity to produce large enough tonnages to support the mill at anything near its maximum capacity. An approach was made to Ghana Railways and an attractive price of 17s 5d per short ton was quoted to ship the ore from Konongo to Tarkwa, based on a daily consignment of 170-200 tons of ore. This scheme has been of mutual advantage to Konongo and Tarkwa; Konongo was saved the burden of overheads in maintaining the mill, and Tarkwa's mill has been used to better advantage.

With the immediate availability of some 125,000 tons of ore, the target extraction rate was set at some 15,000 tons per quarter, a figure well within the capacity of the shafts. At this rate, Konongo had an assured life for two years, during which time it was hoped that new discoveries would further extend the life of the mine. However, despite the conservative targets set for Konongo, they were not met (Table 8.6). It is significant that the best performance was achieved in the first quarter, July to September 1966, when some 95% of the projected 15,000 tons was milled, and this yielded some 5% more gold than had been estimated for that quarter, largely because the final recovery grade was declared at 10.56 dwts per ton compared to the predicted average of 9.5 dwts per ton. However, in subsequent quarters, neither the estimated tonnages reached the mill at Tarkwa nor was the expected quantity of gold produced. Working costs were nevertheless high and exceeded the budget estimates in two of the seven quarters under discussion.

The explanation for Konongo's failure to achieve its targets is somewhat different from that described for Tarkwa, Prestea and Bibiani. The above average performance of the mine in the first quarter of its resumed activity was entirely due to external circumstances.

TABLE 8.6

KONONGO GOLDFIELDS : PRODUCTION JUNE 1966 - MARCH 1968

Quarter ending	Target tonnage	Actual as % target	Target f.oz.	Actual as % target
September 1966	15,000	94.6	7,125	105.2
December	15,000	85.2	7,125	70.7
March 1967	15,000	65.3	7,125	62.5
July	15,000	77.2	7,125	69.3
September	15,000	92.8	7,500	83.5
December	15,000	82.7	7,500	62
March 1968	15,000	62.2	7,500	53.3

Target grade	Actual grade	Working costs as % target	Revenue as % target
9.5	10.56	99	105.2
9.5	7.88	98.8	70.7
9.5	9.10	88.3	66.1
9.5	8.53	101	72.9
10.0	9.00	88.4	83.5
10.0	7.50	113.3	62.0
10.0	8.57	110.8	53.3

Source: S.G.M.C.

This period coincided with a low market price for timber, and so extra trucks were available on Ghana Railways to ship the ore from Konongo to Tarkwa. However, subsequently, there was a shortage of trucks, and Konongo's ore had to compete with timber and cocoa for the allocation of space. And so, while the projected figure of 15,000 tons of ore was virtually achieved at the mine, the ore did not reach the mill at Tarkwa at the same rate; the ore had to be stockpiled on the surface to await shipment. The availability of trucks on Ghana Railways was, therefore, the determining factor in Konongo's performance. The fact that the final recovery grade was less than estimated in all quarters but the first can be attributed to another factor; dilution of the ore through percolation. The fact that the ore is left in the open awaiting shipment, is exposed during transit to Tarkwa, and sits in open trucks at Tarkwa to await unloading means that some of the gold is lost since it is 'free' in the parent ore.

At the Konongo mine, therefore, the shortage of stores was less significant in explaining the disparity between its performance and the targets set. By the time Konongo had reached the producing stage, the shortage of stores was becoming less acute than it had been earlier. The main constraints on its output were the relative availability of truck-space, the frequent delays on the railway from landslides and flooding of the track during the wet season, and the bad state of repair of the locomotives which led to breakdowns and further delays in the shipment of the ore. In March 1968, an additional five trucks were made available for the Konongo ore, which brought the total complement up to fifteen. Nevertheless, the stockpile of ore at the mine was some 2500 tons at June 1968.

(v) Dunkwa Goldfields

Like its sister companies, the dredging subsidiary of the State Gold Mining Corporation failed to meet its production targets, although the constraints on its output were of a different character and more linked with the nature of dredging itself. All other things being equal, the planned throughput for the four dredges was between 2,750,000 and 3,000,000 cubic yards per quarter. These targets were met in the range of 75%-95%, and in only two of the quarters over the period under discussion was less than 80% of target achieved; those coincided with the period of the most intense shortage of stores. However, the gold content of the gravel worked was found to be less than expected on the average and so Dunkwa's gold output was less than the quarterly estimates, and disproportionately low relative to the yardages treated (Fig.8.6a). At the same time, working costs remained high, and, in seven out of the eleven quarters, exceeded the budget estimates in the range 3-20%. By contrast, revenue was much lower than projected and it fell as low as 55% of the expected level in the quarter ending December 1967 (Fig.8.6b).

Dunkwa goldfields was forced to work at sub-normal level throughout the period owing to the acute shortage of stores which hampered operations in all departments. Secondly, its poor performance can be attributed to the extreme variability of ground conditions. D1 encountered extremely shallow ground of low average value, and the running time of the dredge was reduced by the necessity to dig from 4-6 feet of bedrock to maintain flotation of the dredge. The extremes of high and low water in the Offin valley forced the shut-down of D1 and D2 for long periods; for some twenty-three days in the dry season early in 1966, and for a similar length of time during the excessive floods

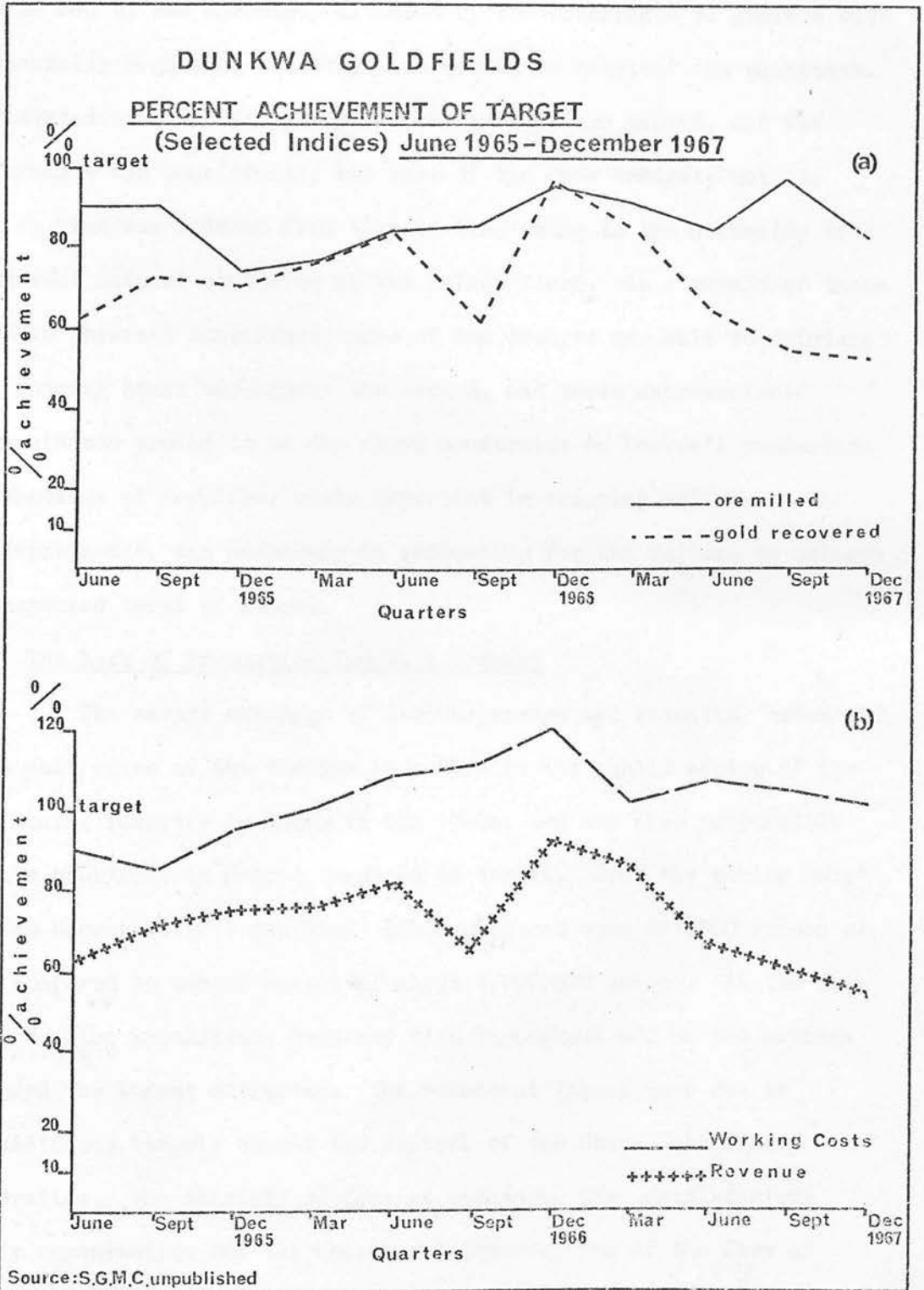


FIG 8.6

experienced in the following wet season. It was virtually impossible to make up the lost dredging time from these interruptions, since the dredges have specified working speeds. The quarterly throughput of both D2 and D3 was adversely affected by the occurrence of gravels with an unusually high sand content, which tended to overload the equipment. D4, located in the Jimi valley, worked much richer ground, and its performance was consistently the best of the four dredges, but its working time was reduced from time to time owing to the necessity to circumvent natural obstacles in the valley floor. As a result of these variable physical conditions, none of the dredges was able to maintain full running hours throughout the period, and these unpredictable circumstances proved to be the major constraint on Dunkwa's production. The shortage of supplies, while important in reducing efficiency in all departments, was secondary in accounting for the failure to achieve the expected level of output.

The Lack of Production Inputs : Summary

The severe shortage of stores, spares and essential materials was a main cause of the decline in output in the public sector of the gold mining industry in Ghana in the 1960s, and was also responsible for the shortfall in output compared to target. Over the period July 1965 to December 1967, the State mines produced some 691,500 ounces of gold compared to target output of about 1,000,000 ounces. At the same time, working expenditure remained high throughout and on the average exceeded the budget estimates. The resultant losses were due to circumstances largely beyond the control of the State Gold Mining Corporation. The scarcity of foreign exchange, the unsatisfactory supply organisation and the consequent interruption of the flow of production inputs stultified the entire production process. This

constraint was not unique to the State mines, but affected all other productive sectors of the publicly-owned enterprises in the country, and particularly those which depended to a high degree on imported materials. In addition, there were local factors which contributed to the poor performance of the State mines in this period. At Tarkwa, the collapse of the labour control organisation aggravated the situation; at Konongo, regular shipment of the ore to Tarkwa proved a problem; Bibiani's ore reserves were gradually exhausted; and in the case of the dredging subsidiary, adverse physical conditions affected its output. These various factors, therefore, explain why the State Gold Mining Corporation was unable to maintain output at the pre-takeover level, but there was a second major source of constraint on production, the lack of adequate ore reserves, and this factor explains the magnitude of the decline in production in the post-takeover years.

2. The Lack of Ore Reserves

Closely related to the post-takeover decline in the volume of production of all the State mines was an acceleration of the fall in known ore reserves (Table 8.7). At takeover, none of the deep-level mines had available more than from one year to eighteen months supply of ore reserves.

There is an intimate relationship between the level of proven ore reserves and the level of production achieved in any one year, since basically, the amount of available ore is the pivot on which the continued production depends. It is desirable that ore mined is replaced through development of new areas to ensure future operations. The ore, the raw material of any mining enterprise, is a 'wasting asset', in that once mined, it is lost forever. The continued existence of the mine depends on the discovery of new ore bodies to replace those depleted

TABLE 8.7

ORE RESERVES : NUMBER OF YEARS AVAILABLE(SELECTED YEARS)

	1955	1957	1959	1961	1963	1965	1967
Tarkwa	4.50	2.50	1.75	1.25	1.25	1.50	1.00
Prestea	5.00	4.00	3.00	1.75	1.25	1.20	2.00
Konongo	6.00	4.00	4.00	3.75	1.75	1.00	1.00
Bibiani	5.50	4.00	2.25	1.00	1.00	1.00	0.50

(Source: S.G.M.C.)

by mining. It is generally accepted that ore should be proven for four to five years ahead of production provided that further geological evidence indicates that further amounts of payable ore can be developed; it is obviously not practicable to determine in advance the total amount of ore that is present in a mine. It is also recognised that any increase in unit working costs may tend to eliminate, as unpayable, substantial tonnages from the declared reserve. The crisis in the gold mining industry in 1961 was largely the result of the inability of the private companies to maintain an adequate supply of ore reserves ahead of production in the light of the ever-increasing costs of production and development. Despite increased investment in exploration and development undertaken by all the private companies in the late 1950s, the results were negative. The lack of new discoveries of potentially profitable ore bodies, and the pressure of rising costs, which eliminated large tonnages from the profitable category, were the main factors responsible for the crisis of 1961.

The State's inheritance, in respect of ore reserves, was therefore poor. Although the State Gold Mining Corporation has been

unable to redress the balance, it has continued to search for new sources of ore. As a result, the State mines have been forced to adopt a 'hand to mouth' policy, and the lack of success in locating new ore bodies within the presently held concession areas has stimulated a great deal of pessimism about their future. In reference to Tarkwa and Prestea, for example, it was stated that,

"There is an impression created by the management that these State mines are exhausted and at best the few years' proved reserves should be mined out to enable complete shutdown" (Cudjoe, 1963, p.39).

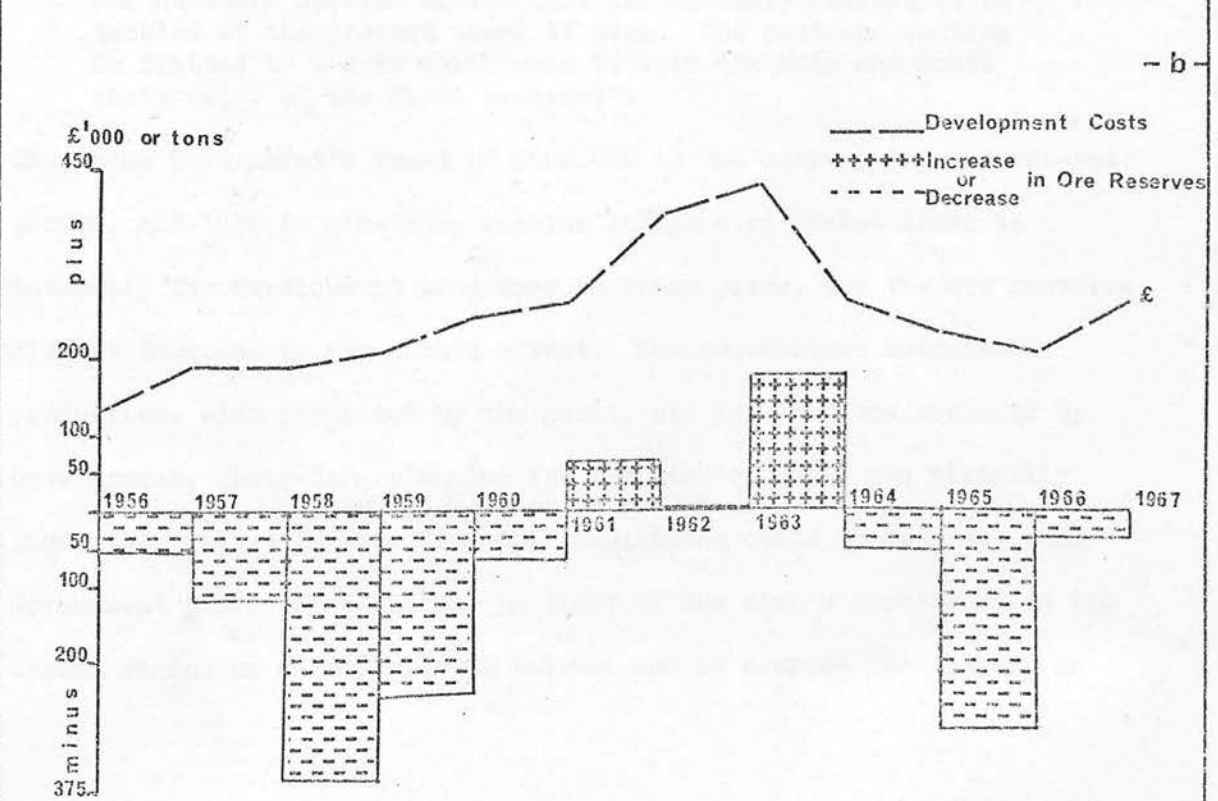
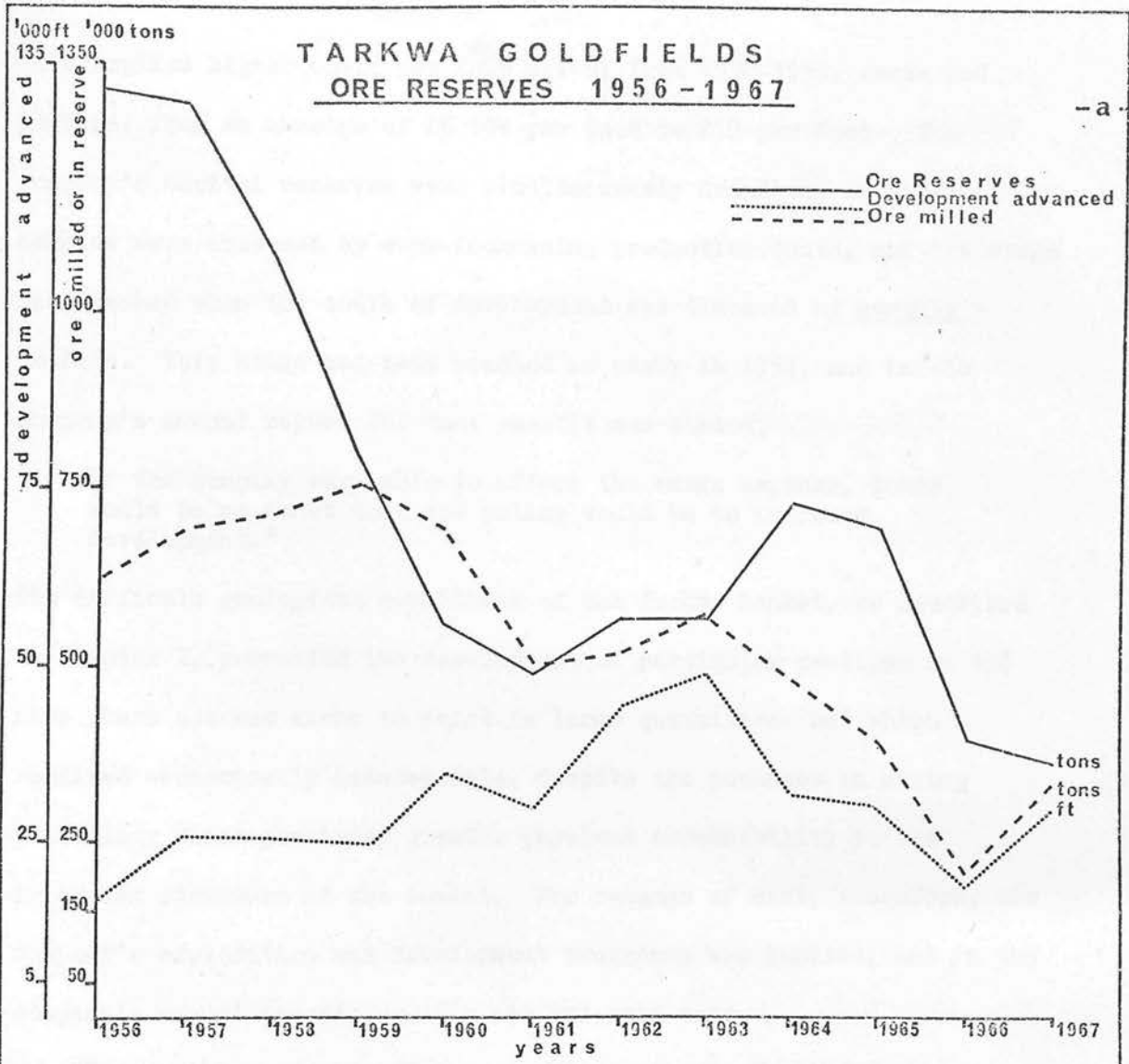
While this may be somewhat exaggerated, there is no doubt that capital is urgently required for further exploration in light of the foreign exchange earning capacity of gold and consistent with the Government's objective in keeping the mines open, as the following analysis of the position with respect to ore reserves will show. It is suggested that this can best be done by examining in detail the situation at each mine, and, since the evaluation of ore reserves is a long-term problem in mining it is considered best to use the annual statistics covering the period 1956-1967.

(i) Tarkwa Goldfields

The ore reserve position at Tarkwa has been in a critical state since the mid-1950s (Fig.8.7a). At no stage since 1955 has the recommended four to five years' forward knowledge of proven ore been attained. From 1956 to 1960, in spite of measures taken by the management to add to the reserve by substantially increasing the development footage driven, from 17,325 feet in 1956 to twice that amount, at 35,771 feet, in 1960, no new ore was discovered by the private company and development expenditure was wasted (Fig.8.7b). During this period of 'barren' development, production had increased in an effort to minimise unit working costs. Consequently, by 1961, there remained less than eighteen

months' proven ore at the prevailing rate of extraction. The State took over the mine at a critical time, when its future prospects seemed limited by this factor. And so, the new management increased the rate of development in an attempt to find new ore, and this reached a peak in 1963, when some 47,000 feet were driven. This effort did result in a slight increase in the mine's ore reserves, from a declared figure of 558,808 tons in 1963 to 745,095 tons in 1964. From 1964, development was curtailed, and by 1966 the annual footage driven had dropped to some 20,000 feet. This was inevitably paralleled by a drop in the available ore reserves, since production, albeit at a lower level than earlier, ate into reserves which were not being simultaneously replaced. Consequently, by 1967, Tarkwa's ore reserves were again at a critically low level, with less than one year's supply of ore blocked out. A more detailed examination of this problem will show that the difficulties which faced the former owners not only persisted after takeover but were magnified owing to the lack of adequate funds for development at the scale required to solve Tarkwa's ore reserve problem.

The immense difficulty in maintaining an adequate level of ore reserves on a high-tonnage, low-grade property in the face of cost inflation is well illustrated by the case of Tarkwa goldfields. Large-scale mining is imperative on a low-grade mine if economies are to be effected, and this inevitably imposes a strain on the ore reserves. Throughout its history, the old company, Amalgamated Banket Areas Ltd., experienced one overriding difficulty, that mining tended to outstrip the ore being added to reserve from development. By the mid-1950s, much of the easily-won ore had been mined, and the geological indications were that the sections ahead could be reached only through zones of unpayable reef, or by driving long cross-cuts through the country rock.



Source: S.G.M.C. unpublished

FIG 8-7

This implied higher costs per foot drive; from 1950-1955, costs had doubled, from an average of £5 10s per foot to £10 per foot. The company's capital reserves were simultaneously dwindling as profit margins were squeezed by ever-increasing production costs, and the stage was reached when the scale of development was dictated by monthly profits. This stage had been reached as early as 1954, and in the company's annual report for that year it was stated,

"If the company were able to afford the extra expense, there would be no doubt that the policy would be to increase development."

The difficult geological conditions of the Tarkwa banket, as described in Chapter 2, prevented the development of particular sections in the mine where ore was known to exist in large quantities, but which remained economically inaccessible, despite the advances in mining technology which permitted greater physical accessibility to the irregular structure of the banket. For reasons of cost, therefore, the company's exploration and development programme was limited, and in the company's annual report for 1955, it was said that,

"The northern section of the mine is too badly faulted to be tackled at the present time, if ever. The southern section is limited by a dyke which runs between the Main and South shaft (sic. of the Fanti section)".

The Ghana Government's grant of £100,000 to the company for the two-year period, mid-1956 to mid-1958, enabled Amalgamated Banket Areas to intensify its development programme in these years, but the ore reserves did not increase to any marked extent. The concomitant increase in production, also permitted by the grant, ate into the ore replaced by development. Long-term planning for the mine's future was virtually impossible unless further financial assistance could be secured. The Government proved sympathetic, in light of the mine's importance in the Tarkwa region as an employer of labour, and it awarded the company an

interest-free loan of £450,000 to be spread over three years. Meanwhile, an 'ad hoc' committee set up to consider the whole question of aid to marginal mines recommended that the mines had the capacity to continue on their own resources. As a result, the Government withheld further financial aid from Amalgamated Banket Areas from December 1960. This proved disastrous, and the Directorate announced in January 1961 their intention to close down the outlying sections of the property with immediate effect.

At takeover, there was barely sufficient ore for one year's production, and subsequently development has not reached the scale demanded by the low level of ore reserves, largely owing to the lack of surplus capital. In addition, the development programme had to be curtailed owing to the shortage of drilling equipment and other stores contingent with the general shortage of production inputs already described. Since 1961, therefore, the State Gold Mining Corporation has found it impossible to build up an adequate level of ore reserves, and hence the 'hand to mouth' basis on which operations have continued. The level of ore reserves and the level of production are therefore inextricably bound together, and the constraining influence of the shortage of production inputs affected both. These factors in combination therefore largely account for the poor performance of Tarkwa goldfields since takeover in 1961. A new incline shaft is presently being sunk to the north-east of the property, and it is hoped that large tonnages of ore can be brought into reserve from this hitherto inaccessible section of the mine. At the time that the field work for this study was undertaken, active consideration was being given to the possibility of de-watering the Taquah & Abosso mine, whose premature closure in 1956 was described in Chapter 6. It will be recalled that when that mine

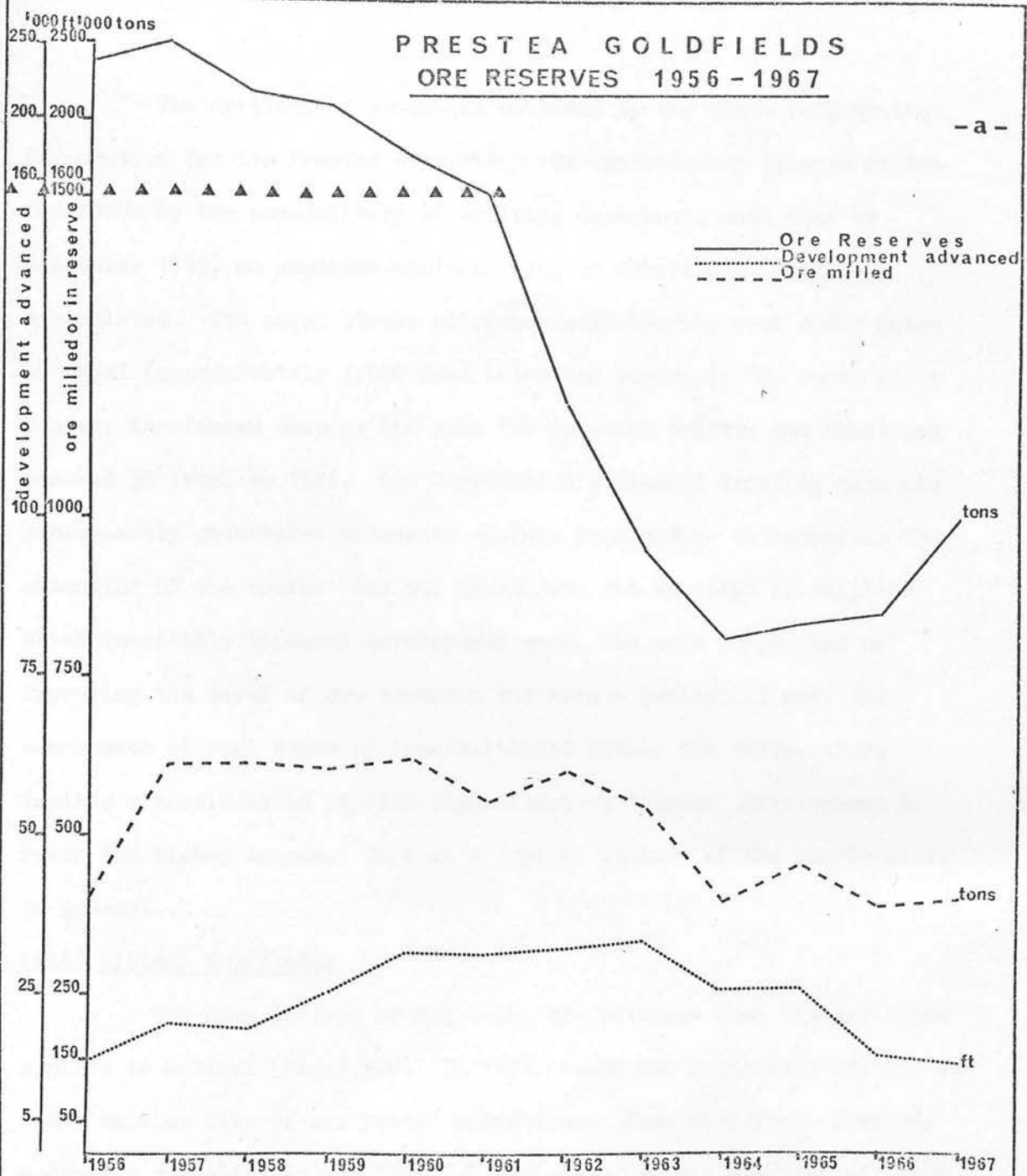
closed, there was ore to the value of nearly £1,000,000 ready blocked out for mining. With these considerations in mind, Tarkwa goldfields may prove a better asset to the Corporation than it has to date.

(ii) Prestea Goldfields

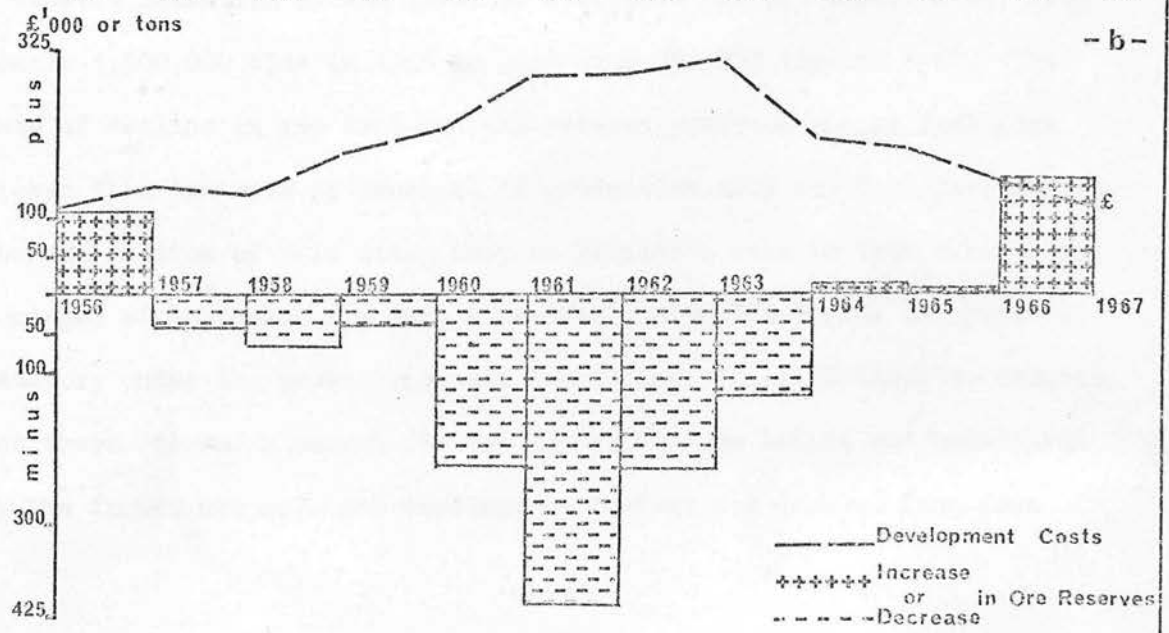
Prestea's ore reserves have, like those of Tarkwa goldfields, steadily diminished from the mid-1950s (Fig.8.8a). In 1955, there was five years' supply of ore proven, but by the time of its takeover by the Government, there was barely enough for two years of mining at the prevailing rate of extraction. From 1956 to 1964, except for a slight improvement in the declared reserves in 1957, there has been a continuous decline, in spite of efforts to arrest it by increasing the scale of development; from 1956 to 1960, the private owners increased the development footage driven three-fold in an effort to maintain the position as of 1955, but few positive finds were made (Fig.8.8b). At the same time, the scale of mining had been stepped up to offset increases in working costs, and these extra tonnages were mined from reserve without replacement. One official of the Prestea company suggested that the poor inheritance of the State in respect of Prestea's ore reserves was largely the fault of the departing company, which had 'starved' the mine of development capital on the scale required since Prestea is a large-tonnage proposition. Nevertheless, Prestea's future was the most assured of all the State mines at takeover. Ore has been added to the reserve since 1961, but not at a sufficiently high rate to maintain the inherited two-year margin, which had dropped to about eighteen months by 1966. However, by the end of 1968, available ore reserves at Prestea were declared to be nearly 1,500,000 tons at 6.44 dwts per ton; this would extend the life of the mine by nearly four years, even if no new discoveries were made in the meantime.

PRESTEA GOLDFIELDS ORE RESERVES 1956 - 1967

- a -



- b -

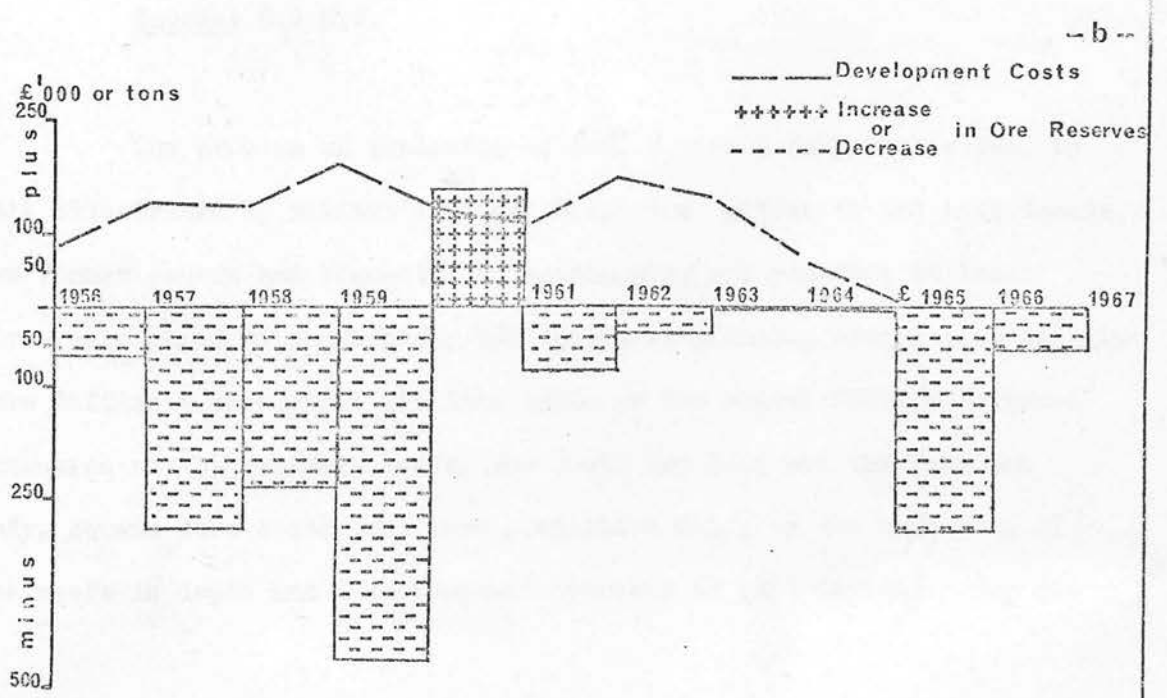
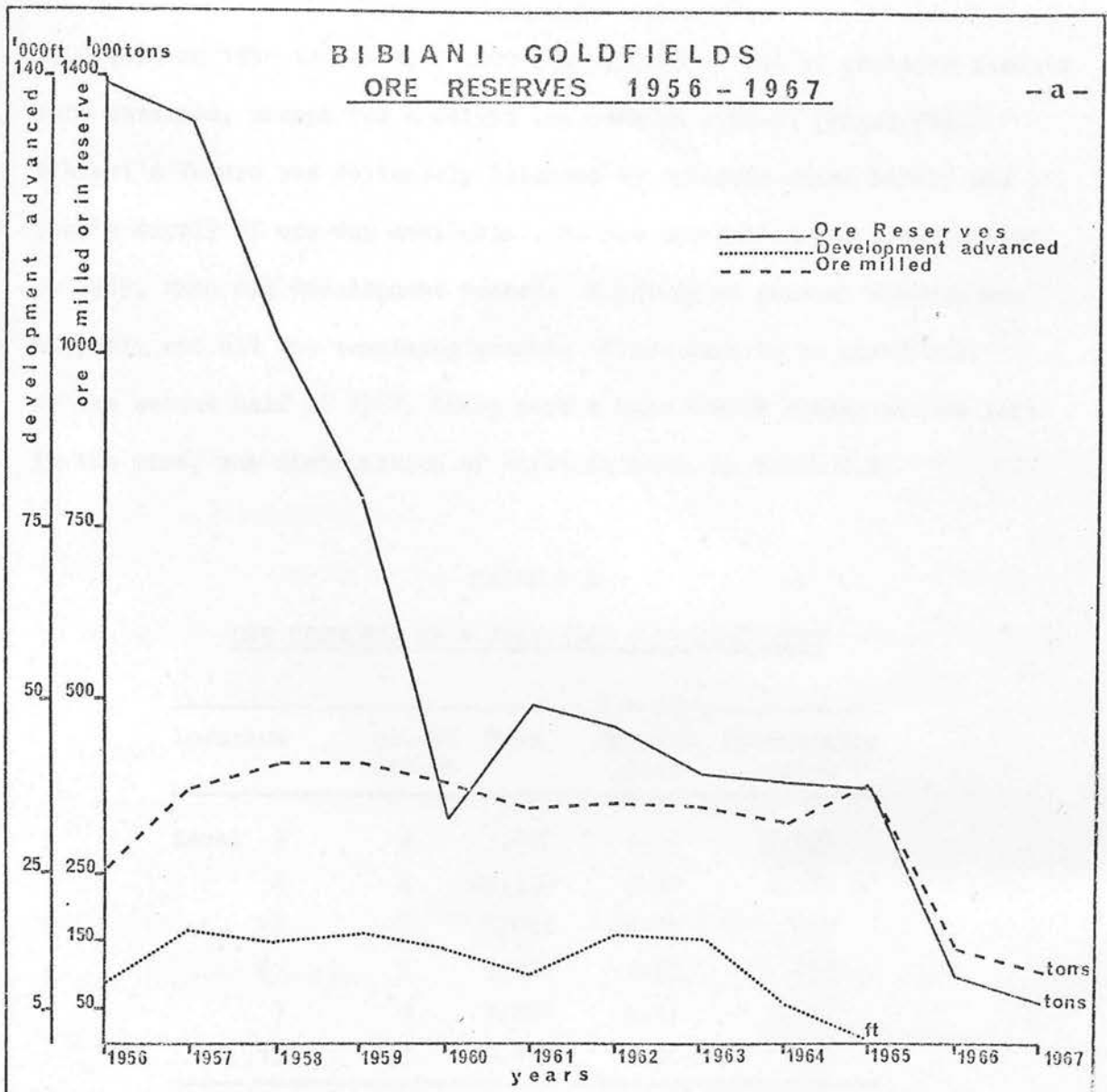


Source: S.G.M.C unpublished

The development programme outlined by the State Gold Mining Corporation for its Prestea subsidiary was considerably delayed in the mid-1960s by the non-delivery of drilling equipment, such that by September 1965, an eighteen-month backlog of development work had accumulated. The major blocks of richer gold-bearing reef occur below 30 level (approximately 4,500 feet below the surface). To reach these lenses, the former company had sunk two internal shafts, and these had reached 35 level by 1961. The Corporation's diamond drilling team has subsequently undertaken extensive surface prospecting to ascertain the extension of the reefs. And so, apart from the shortage of supplies which inevitably hindered development work, the main constraint on improving the level of ore reserves has been a geological one; the occurrence of vast zones of impoverishment within the reefs, which implies a considerable capital expenditure on 'barren' development to reach the richer lenses. This is a typical feature of the quartz mines in general.

(iii) Bibiani Goldfields

The same pattern of declining ore reserves from the mid-1950s applies to Bibiani (Fig.8.9a). In 1956, there was sufficient ore for at least another five or six years' production. From that year, however, a drastic reduction in the level of available ore was experienced; from nearly 1,500,000 tons in 1956 to just over 250,000 tons in 1960. The rate of decline in the declared ore reserve position was in fact much higher than the rate of increase in production over the four-year period. The explanation of this steep drop in Bibiani's case is that substantial tonnages of low value ore were effectively eliminated from the payable category under the prevailing cost conditions. In an attempt to counteract these losses, a search for new and richer ore bodies was undertaken by the former company, and development footage was doubled from some



Source: S.G.M.C. unpublished

FIG 8.9

8500 feet in 1956 to nearly 18,000 feet in 1959. But no positive results were obtained, except for a slight increase in 1960-61 (Fig.8.9b).

Bibiani's future was delicately balanced by takeover since barely one year's supply of ore was available. No new ore bodies had been located by 1965, when all development ceased. A policy of gradual closure was adopted, and all the remaining pockets of ore were to be mined out.

By the second half of 1967, there were a mere twelve blocks of ore left in the mine, the distribution of which is shown in Table 8.8.

TABLE 8.8

ORE RESERVES AT 1 JULY 1967 : BIBIANI MINE

Location	No. of blocks	Tons	Sampled grade	Recoverable ounces
Level 3	2	7,060	4.16	1,225
4	4	29,330	3.90	4,575
5	1	5,010	4.25	852
6	1	1,800	3.80	273
7	3	9,860	4.17	1,647
12	1	2,750	3.85	423

Source: S.G.M.C.

The problem of depletion of ore, a mine's only real asset, is well illustrated by Bibiani's case. Until the middle of the last decade, the former owners had succeeded in maintaining ore reserves at least five years ahead of production, but long-term planning became increasingly more difficult throughout the late 1950s as the search for the downward extension of the two main reefs, the South Ore Body and the Main Ore Body, became more costly and less productive owing to the narrowing of the reefs in depth and a concomitant decrease in gold content. The few

new discoveries of pockets of ore located below 12 level were found to be of insufficient size or value to offset the expansion in production which became necessary after 1956. In addition, rising costs made large tonnages of ore uneconomic, and with gradually dwindling profits, development was forcibly limited. The Ghana Government refused financial assistance which the company had requested to permit an intensification of exploration and prospecting to improve its ore reserves, and as a result the company was forced to announce its intention to put the mine on a care and maintenance basis.

The Ghana Government bought the Bibiani mine at a time when it seemed to be near the end of its life, but it was anxious to forestall closure for social and economic reasons, and a further exploration programme was initiated. Hitherto, the old company had concentrated all development within the mine itself, but since the zone of mineralisation was known to extend northwards, the Government authorised exploration in that direction. Meanwhile the mine was kept open by mining ore of very low grade, and certainly much lower grade ore than the departing company could have afforded to mine; Bibiani therefore remained open for seven years longer than anticipated at 1960. But, during this period up to 1965 no new ore had been proven, and it was realised that,

" ... we now have to face the rundown and final closure of this area" (S.G.M.C.).

The cost of keeping Bibiani open has been excessively high, and more so since the State Gold Mining Corporation does not have a reserve of working capital. It was therefore concluded in August 1968 that,

" ... geological prospecting and exploratory diamond drilling undertaken over a considerable number of years by Bibiani (1927) Ltd., the Geological Survey Dept, and the State Gold Mining Corporation have discovered no potentially economic ore bodies, either in size or grade of ore, upon which development operations could have been concentrated to offset the depletion" (S.G.M.C.).

However, a subsequent survey contradicted these conclusions, and a possible extension to the life of the mine was recommended on the basis of fresh evidence unearthed from the records at the mine. These records indicated that an ore-body with an average grade of 18.6 dwts per ton had been located in the upper levels of the mine in April 1965, and it appeared that this had not been worked. The report also expressed the view that the results of the surface drilling programme of the Geological Survey should not be regarded as conclusive since,

" ... it is highly probable that the angles for drilling were not correct. This would mean that the reef was completely missed. The average dip of the reef is between 48 degrees and 55 degrees and the drilling angle of 53-65 degrees would probably deflect from the reef or barely scratch the surface of it" (S.G.M.C.).

In the light of this new evidence the Government gave the mine a grant of £50,000 to prove or disprove the extension of the reef. Meanwhile, since all active mining ceased in September 1968, the mine has been on a care and maintenance basis pending the results of these new investigations.

The drastic decline in output at Bibiani since takeover has therefore been directly related to the depletion of ore reserves, and the lack of production inputs merely delayed the final cessation of active mining by some months.

(iv) Konongo Goldfields

The situation in respect of ore reserves at Konongo was similar to that described for the other State mines in that a decline was continuous from the mid-1950s (Fig.8.10a). A steady fall in the level of ore reserves of some 7000 tons per annum occurred from 1956 to 1961, and although the former owners tried to halt this decline by increasing the scale of development from 3046 feet driven in 1956 to 8287 feet in 1962, it was to no avail (Fig.8.10b). After 1961, the ore

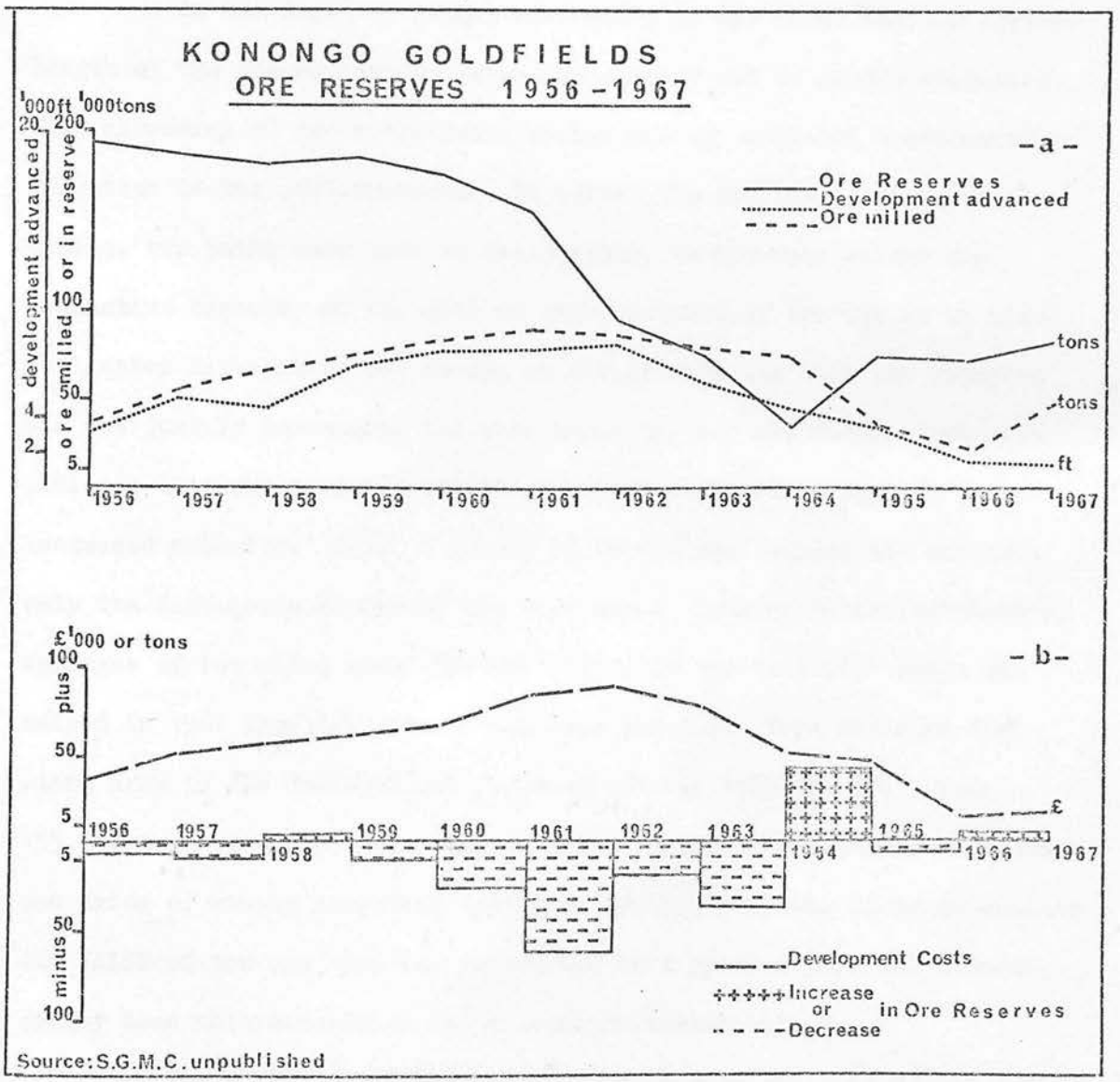


FIG 8-10

reserves fell at a much steeper rate, by some 40,000 tons per annum, or nearly six times the rate of decline of the previous five years. By 1964, development had fallen to about half its peak level over the period under discussion, while at the same time the increased rate of extraction begun in the 1950s continued until the mine was bought by the Government in 1965. By that stage, there was only 38,000 tons in reserve, which was sufficient for only six months of mining.

As the depth of mining increased, it was found that the strike-length of the ore-bodies decreased and pinched out to narrow stringers. This narrowing of the reefs meant higher mining costs and a concomitant reduction in the gold produced. To offset the increasing costs of mining, two paths were open to the company, to increase either the productive capacity of the mill or the pay limit of the ore to be mined. The latter alternative was chosen on the grounds that the ore reserves did not justify increasing the mill capacity, nor did future prospects indicate that ore reserves would ever attain a level to justify the increased capacity. Thus, a policy of 'selective' mining was adopted; only the high-grade blocks of ore were mined, leaving intact substantial tonnages of low value ore. The pay limit, or the 'cut-off' grade was raised in 1961 from 4.5 dwts to 7.5 dwts per ton. This explains the stark drop in the declared ore reserves between 1960 and 1961, from 155,000 tons to 93,000 tons respectively. These circumstances illustrate one axiom of mining economics that, the LEVEL of working costs determines the VALUE of the ore that can be treated at a profit; physical accessibility does not necessarily imply economic accessibility.

The policy of selective mining shortened the life of the mine, and its available ore reserves therefore fell at a faster rate than would have occurred by normal 'mass' mining procedure. The private

company, fully aware of this limitation, approached the Ghana Government in 1963 to purchase its assets, and, in the two years of negotiations which followed, the company carried on the bare minimum of development work. At the same time, production was maintained at a high level, and the company virtually 'picked out the eyes' of the mine, and the cut-off grade had reached 10.8 dwts per ton. At takeover in 1965, there was only 935 tons of ore blocked out for immediate mining, although known ore reserves were somewhat higher. Nevertheless, the State's inheritance was critically poor, and it was virtually impossible to carry on, and so all active mining was stopped in June 1965 while an examination of the property was undertaken. The staff recalculated the available ore reserves to be some 125,000 tons at an average sampled grade of 9.5 dwts to the ton (Table 8.9).

TABLE 8.9

ORE RESERVES AT KONONGO
CALCULATED AS OF JULY 1966

Location	tons	dwts	width (inches)	gold content (f. oz.)
Ore in accessible blocks	78,380	8.2	65	32,310
Ore in blocks not immediately accessible	105,810	8.2	58	43,300
Ore in pillars	15,810	16.2	58	12,820
Surface stockpile	3,400	20.0	-	3,400

Source: S.G.M.C.

The mine was reopened in July 1966, but the ore was sent to the mill at Tarkwa to be treated, until such time as a level of ore reserves could be built up to justify reopening the mill. The development programme undertaken by the State Gold Mining Corporation has been confined to exploration of possible extensions of blocks in the upper level of the Boabedroo and Zongo sections of the mine. Simultaneously, surface prospecting has been carried out to the north-east of the property to ascertain the extension of the Gibson reef after favourable borehole indications were obtained from this area; some of the cores assayed over 150 dwts to the ton over 28 inches of reef. During 1968, considerable sums were also spent in putting out long drives and cross-cuts from 2 level Zongo to reach the intersection of the reef as defined by the borehole records.

Konongo's low level of production since it became part of the State group of mines in 1965 is therefore directly related to the low level of ore reserves inherited at takeover, and the lack of production inputs had only a marginal effect on the mine's capacity to produce.

(v) Dunkwa Goldfields

Ore reserve availability is a markedly different question in a dredging operation, since it is possible to evaluate both the amount and value of the total ground to be dredged at the onset. The working life of a dredging operation can therefore be fairly accurately defined, all other things being equal. It is hardly surprising therefore that the available yardage of gravel showed a continuous decline over the period under discussion. The former company were forced to transfer the dredges to new dredging grounds in the 1950s since they had reached the end of their concessions in the Ancobra valley. When the State bought the dredging company's assets in 1961, there remained sufficient

ore for about ten years continued operation. Currently, there is some concern for the future of the dredging subsidiary as a four-dredge operation since all are reaching the limits of the presently-held concessions. In the quarterly report for the period ending March 1968, the life expectancies of the dredges were given as four years for D1 and D2, 1.8 years for D3 and 2.9 years for D4. Negotiations were then taking place to acquire an extension of the areas leased in the upper Offin valley, and prospecting was being done ahead of D4 in the Jimi valley. In the case of Dunkwa goldfields, the level of ore reserves has had little direct influence on its reduced output since takeover. The only aspect of ore reserves which did bear on its performance was the frequent occurrence of low-value patches of ground.

The Lack of Ore Reserves : Summary

It has been shown that the persistently low level of ore reserves on the State mines was a major constraint on production since 1961. None of the deep-level subsidiaries were able to accumulate adequate reserves to maintain production at the pre-takeover level. The particular circumstances accounting for this situation varied from mine to mine according to geological, economic and other factors. In the immediate pre-takeover years, the private companies were unable to arrest the decline in their ore reserves largely as the result of increasing working costs and dwindling profits which limited the scale of exploratory and development work which could be undertaken. After takeover, the decline in ore reserves intensified owing to the shortage of production inputs and the lack of a reserve of working capital with which to finance the large-scale development that was required. A circular pattern of cumulative causation resulted in diminishing returns; ore reserves remained low owing to the lack of production inputs and

surplus capital; production targets could not be met owing to the low level of available ore reserves. This vicious circle of inter-related events led to the downward trend in production experienced by the public sector of the gold mining industry in Ghana in the 1960s. The significance of these factors in affecting output is made even clearer when the performance of the State mines is contrasted with that of the private sector over the same period.

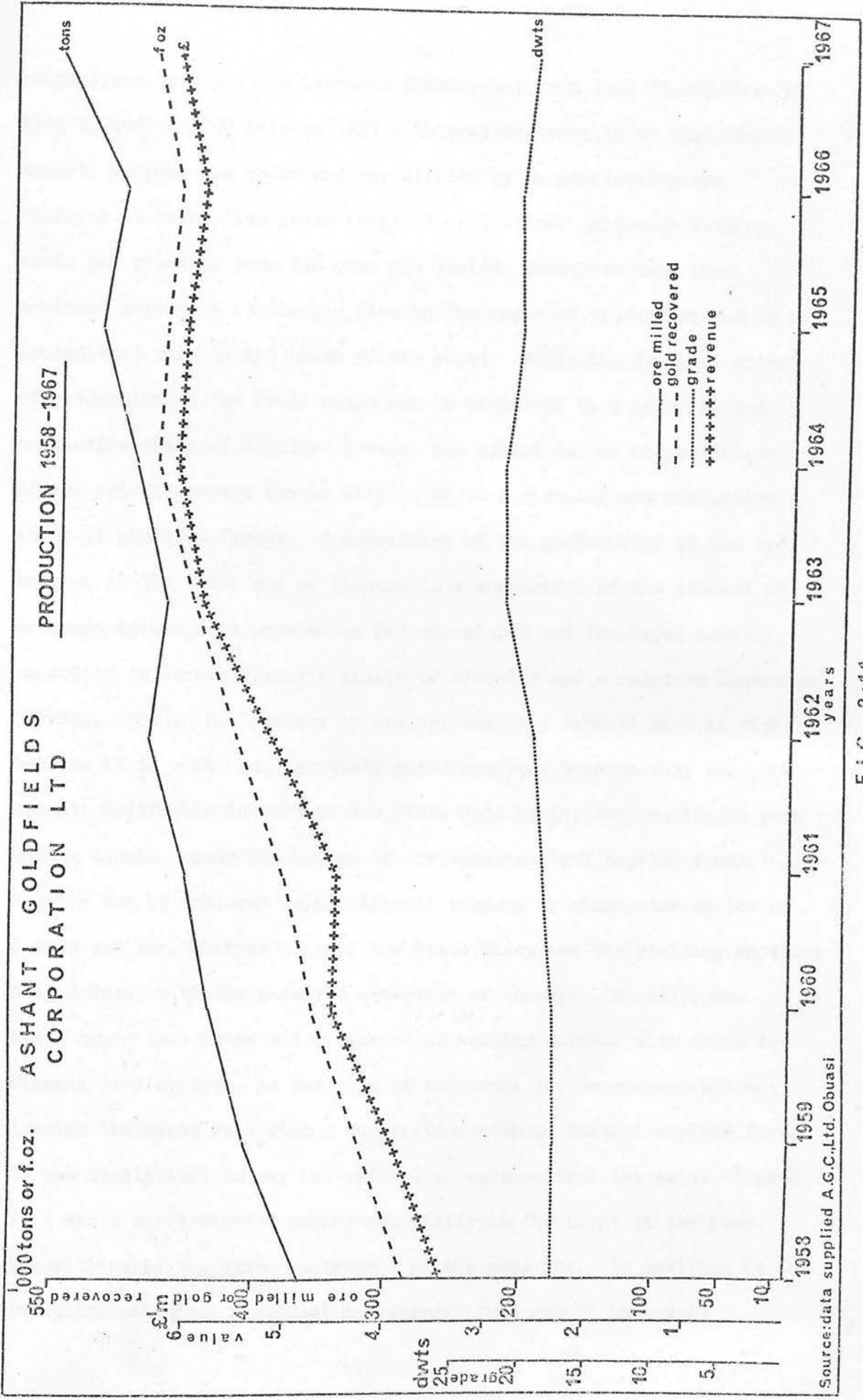
THE PERFORMANCE OF THE PRIVATE SECTOR

It has been shown that the output of the State Gold Mining Corporation in the 1960s could not be maintained at the level achieved in the years before takeover. By contrast, output in the private sector has continued to rise (Fig.8.11). Between 1958 and 1967, in common with all the other gold mining companies, Ashanti Goldfields Corporation increased its scale of operations in response to rising working costs. Thus, the tonnage of ore treated in the mill rose by some 50% over the period, and gold output increased accordingly from some 282,000 ounces in 1958 to some 475,000 ounces in 1967. What is particularly significant is that the final recovery grade, or the yield per ton, never fell below 17 dwts and rose as high as 21.68 dwts in 1964. These figures tend to carry their own commentary.

In essence, the ability of the Ashanti mine to attain an ever-increasing scale of production rested on two main factors, the strong financial balance of the company and its continuing high level of ore reserves of very high value ore. At September 1960, the ore reserves were declared at some 2,500,000 tons yielding 16.89 dwts per ton, and by September 1965, ore reserves had risen to some 3,290,000 tons valued at 19.92 dwts per ton. With high working profits, the

ASHANTI GOLDFIELDS CORPORATION LTD

PRODUCTION 1958-1967



Source: data supplied A.G.C. Ltd. Obuasi

FIG 3.11

company has been able to increase development from some 43,000 feet in 1958 to over 61,000 feet in 1967 with positive results so that the Ashanti company has never had any difficulty in maintaining ore reserves at least five years ahead of production. Although working costs had risen by some 75% over the period, economies have been achieved through a continuous rise in the scale of production and by a concomitant rise in the grade of ore mined. While the downward spiral of production on the State mines can be explained by a circular and cumulative chain of negative forces, the upward spiral of production of the private sector can be attributed to a circular and cumulative chain of positive forces. A comparison of the performance of the two sectors in the 1960s can be likened to a comparison of the process of economic development between an underdeveloped and developed country, according to Gunnar Myrdal's thesis of circular and cumulative causation (Myrdal, 1957). One can say by analogy that the Ashanti mine is rich because it is rich, and the State mines are poor because they are poor. Ashanti Goldfields is rich as the State Gold Mining Corporation is poor on two counts, grade and volume of ore reserves, and capital funds. Profits can be achieved by the Ashanti company by mining ore as low as 8 dwts per ton, whereas none of the State mines has ore yielding anything near 8 dwts, with the possible exception of Konongo. Equally, the State mines have never had a reserve of working capital with which to finance development. At the time of takeover, the Government did not provide the State Gold Mining Corporation with an initial capital fund; it was merely left to pay its way out of revenue from the sales of gold. This was a short-sighted policy especially in the light of the poor inheritance of the State in respect of ore reserves. In addition to the purchase price, a special development fund should have been

established. The shortage of production inputs merely aggravated the situation, and meant that the State mines were unable to maintain the level of production achieved by the former private companies.

CONCLUSION

Although the output of the gold mining industry has contracted during the 1960s, Ghana still retains its position as the sixth largest producer of gold in the free world. Equally in local terms, gold still has a high internal and external value in the economy; value added in 1967 increased by about 20% bringing the mining sector's contribution to Gross Domestic Product to 3%; and gold exports, valued at some £9,000,000, made it the third largest earner of foreign exchange, after cocoa and timber. Production figures for 1968 indicate that the industry is recovering to some extent from the adverse conditions experienced in the mid-1960s. Supplies began to flow with more regularity towards the end of 1968, and the Government voted a £3,500,000 Development Fund to the State Gold Mining Corporation for the fiscal years 1966-67 to 1968-69. Thirdly, the establishment of the two-tier system of gold prices under which gold can fetch a higher price than 35 US dollars per ounce, and the devaluation of the local currency, helped the Ashanti mine to proceed with its development programme at a higher rate of investment, and assisted the State Gold Mining Corporation to redress some of the losses sustained in previous years.

The Government's takeover of the marginal mines in 1961 prevented the sudden loss of revenue of several millions of pounds, and, with Government support, the State mines have contributed to the country's foreign exchange earnings. There is an ever-retreating line between the profitable and sub-marginal ores that can be mined under the inflationary

economy that has obtained since the second world war. Under these conditions, the gold mining industry is barely able to survive without government support. In Ghana, the State chose to buy its marginal mines as the most suitable measure of the times, times characterised by a drive towards economic independence, and it is in these terms that the Government's takeover of the marginal mines should be understood. It was hoped that output and employment could be maintained in support of the long-established mining communities. Output has been maintained, albeit at a lower level than was anticipated. In Chapter 9, the extent to which this decline in output has affected employment in the industry is examined.

CHAPTER 9

CHARACTERISTICS OF THE LABOUR FORCE IN GOLD MININGINTRODUCTION

It was shown in Chapter 8 that output in the gold mining industry in Ghana has declined in recent years and particularly since the early 1960s owing to unfavourable circumstances largely outside the control of the industry itself. The analysis also revealed an element of contradiction in Government policy as it affected the ability of the public sector of the industry to maintain output. On the one hand, the Government's direct participation in gold mining was based on the requirement of maintaining output of gold as a means of earning foreign exchange. On the other hand, the restrictions which the Government imposed on foreign exchange spending severely curtailed the productive capacity of the industry since it was unable to import the necessary production inputs. The takeover of the marginal gold mines was also based on social grounds, however, and it is the purpose of this chapter to describe and analyse the trends in employment in the industry over the period 1956-1967 to assess the performance of labour as a factor of production, to investigate the structure of the labour force and to define some of its characteristics as they are relevant to production.

Throughout the history of commercial gold mining in Ghana, the mines have been one of the main sources of employment on a large scale. The crisis in the industry in January 1961, when two of the largest mines threatened to close down, would have led to large-scale unemployment in these mining districts had the closures taken place. The Government's purchase of these two mines and three of the other

marginal properties averted the crisis, and assured not only continued employment to the mines' labour force but also the continued prosperity of the communities which have grown around the mining nuclei. Indeed, it was this social objective that was emphasised at the time of takeover.

At local level, the mines attract population, both those seeking wage-earning employment on the mines and those who seek to benefit from the market potential offered by the geographical concentration of spending power in and around the mining towns. The mines' labour force provides a permanent market for goods and services compared to the seasonal nature of the market in the cocoa-growing districts. In 1961, the five mines involved in the takeover had a combined labour force of some 17,000-18,000, and the mining towns which have grown around the mines supported a combined population of some 46,800, and 63,100 including Konongo which was added to the State group in 1965 (Census, 1960, Special Report 'A').

At regional level, the mining industry absorbs a high proportion of wage-earning labour. For example, in the Western Region, where four of the five State mines are located, one-quarter of the industrial labour force was engaged in the mining industry in 1960 (1963 Statistical Yearbook). The Western Region is sparsely populated and the mining areas stand out as islands of higher density. Employment opportunities are limited to the industrial sector, with unemployment in the Western Region the highest of all regions for the year 1960, when a monthly average of 3,450 people were registered as unemployed. The closure of the marginal gold mines would therefore have added to the already high unemployment in that region.

In the national context, the mining industry has traditionally been one of the main foci of employment in the labour market, although

in the past two decades, its proportion of the total wage-earning labour force has declined relative to other employment (Tables 9.1 and 9.2). It should be noted that employment in the industrial sectors of the economy absorbs only some 25% of the total national labour force; over 60% are still employed in agriculture. The rate of decline in the mining sector's share of the total labour force must be read in light of both the increasing accuracy of the data and the increasing number of reporting establishments. The contraction of the mining industry and the parallel growth of other labour-intensive industries are secondary factors. In 1960, the mining industry employed some 8.7% of the national labour force, and the mines involved in the takeover employed 4%. The national unemployment rate for that year was recorded at a conservative 25%, and so the additional burden of several thousand more unemployed would have aggravated an already unmanageable scale of unemployment. The social implications of the takeover of the marginal mines in January 1961 can therefore be readily understood in terms of their importance in the labour market at local, regional and national levels.

THE STRUCTURE OF THE LABOUR FORCE

1. Africans Employed

The most notable trend over the period 1956-1967 has been the secular decline in the numbers employed in the gold mining industry (Fig.9.1); this has followed the contraction in output. In the late 1950s, employment rose marginally in response to the increased scale of operations, from 15,388 employees in 1956 to 15,775 employees in 1960. But the adoption of mechanisation and labour-saving devices wherever possible meant that employment did not rise in proportion to the rise

STATE MINES

AFRICAN LABOUR FORCE 1956-1967

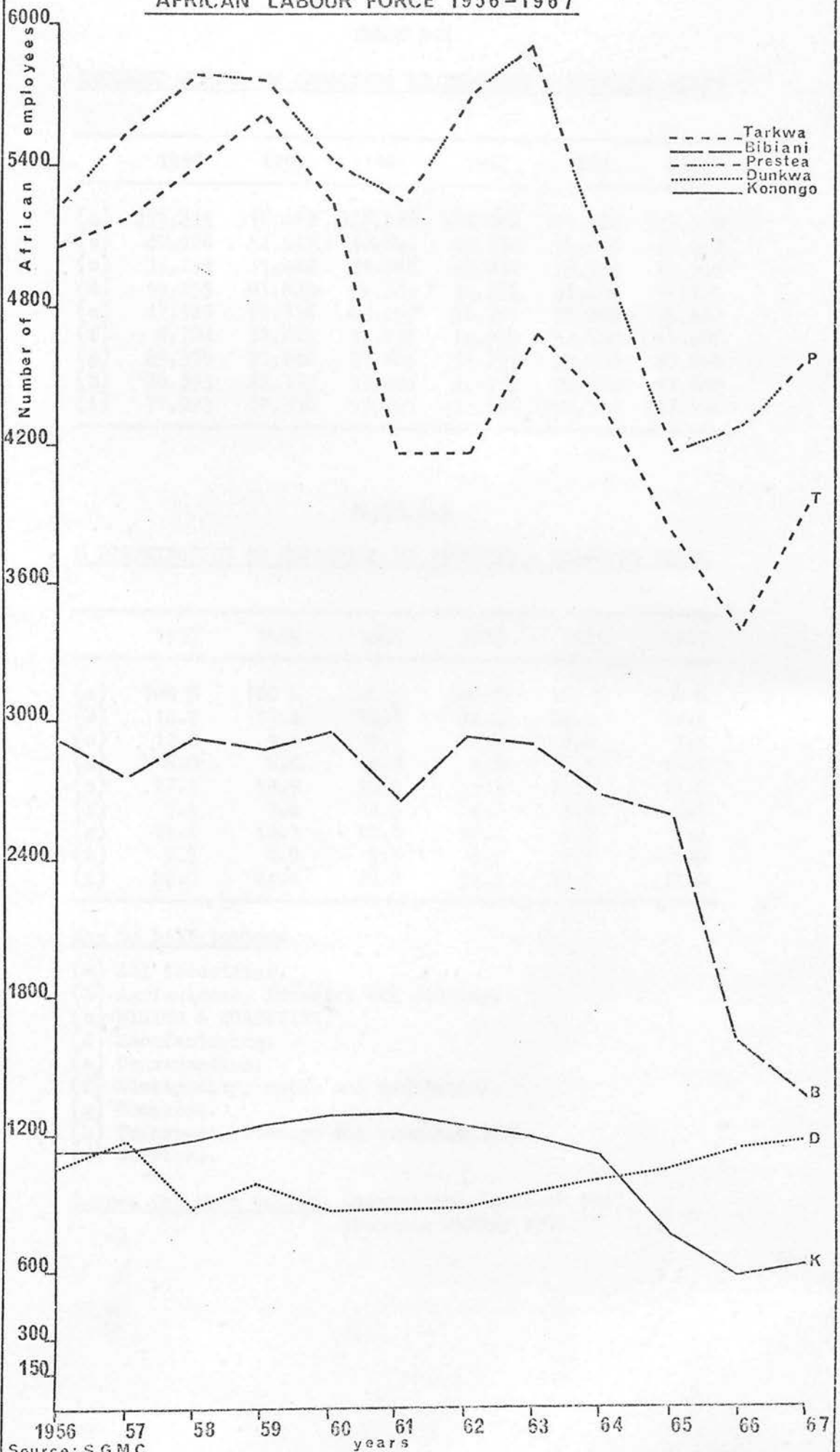


TABLE 9.1

RECORDED NUMBER OF EMPLOYEES BY INDUSTRY : SELECTED YEARS

	1957	1959	1961	1963	1965	1967
(a)	277,415	319,477	349,932	374,086	391,900	343,300
(b)	40,926	54,947	48,046	46,330	55,900	49,000
(c)	33,231	31,402	28,466	29,861	26,700	25,300
(d)	19,255	21,828	29,301	32,364	31,800	36,100
(e)	47,586	60,338	63,259	58,351	72,800	45,400
(f)	8,704	12,215	15,735	14,969	14,000	15,400
(g)	29,395	31,802	37,686	37,293	32,000	28,500
(h)	26,393	27,395	33,495	32,733	30,300	27,500
(i)	71,923	79,550	93,941	121,985	128,300	116,100

TABLE 9.2

% DISTRIBUTION OF EMPLOYEES BY INDUSTRY : SELECTED YEARS

	1957	1959	1961	1963	1965	1967
(a)	100 %	100 %	100 %	100 %	100 %	100 %
(b)	14.7	17.2	13.7	12.3	14.3	14.3
(c)	12.0	9.8	8.1	7.9	6.8	7.4
(d)	6.0	6.8	8.3	8.6	8.1	10.5
(e)	17.1	18.8	18.8	15.5	18.6	13.2
(f)	3.1	3.8	4.5	4.0	3.6	4.5
(g)	11.6	10.3	10.0	10.4	8.2	8.3
(h)	9.5	8.5	9.5	8.7	7.7	8.0
(i)	26.0	24.8	26.8	32.5	32.7	33.8

Key to both tables:

- (a) All industries.
- (b) Agriculture, forestry and fishing.
- (c) MINING & QUARRYING.
- (d) Manufacturing.
- (e) Construction.
- (f) Electricity, water and sanitation.
- (g) Commerce.
- (h) Transport, storage and communication.
- (i) Services.

Source for both tables: Statistical Handbook 1967
Economic Survey 1967.

TABLE 9.3

ACTUAL NUMBERS EMPLOYED COMPARED TO TARGET COMPLEMENT

	Average weekly target	Average weekly strength	Average % excess		
			Total	U	S
Tarkwa	3800	4408	16	9	7
Prestea	4500	4536	0.8	0.8	-
Konongo	600	610	1.7	0.5	1.2
Bibiani	996	1046	5	-	5

U = Underground. S = Surface.

in production. After 1960, the labour force on the State mines has declined by about 3000 to an annual average of some 11,800 employees in 1967. The reduction in the numbers employed after takeover has not been entirely in step with the decline in output, however, since a considerable scale of 'latent' unemployment has been characteristic of the State mines labour force in the 1960s. On the basis of weekly labour returns for a sample 48-week period, August 1967-August 1968, it was found that for the four deep-level mines of the State group the target labour complements, designated in accordance with the target production levels, were exceeded in varying proportions by all the mines (Table 9.3). These statistics reveal that the highest rate of overemployment was at Tarkwa, where it was found that, over the 48-week sample period, labour exceeded requirements by some 8% to 25%. This is all the more significant in the light of the previously established trends in production at Tarkwa, which failed to achieve the target level of production in the same period. The degree of latent unemployment must, therefore, be even higher than these figures suggest. Apart from Bibiani, the other subsidiaries have contained the volume of excess labour within 2%. By sector, the higher

wastage of manpower is found underground on all the mines except at Bibiani, where the surface excess can be attributed to the large numbers working on the company's timber concession. Therefore, despite the reduction in the total numbers employed on the State mines, there still remains a considerable degree of over-manning in most sections relative to the output achieved. This situation can be understood largely in the light of the policy of maintaining full employment irrespective of the scale changes in production, as was explicitly stated by the then Managing Director of the State Gold Mining Corporation in 1965, the nadir year for gold production, when he wrote,

"In accordance with our policy of full employment, labour has not been laid off" (S.G.M.C.)

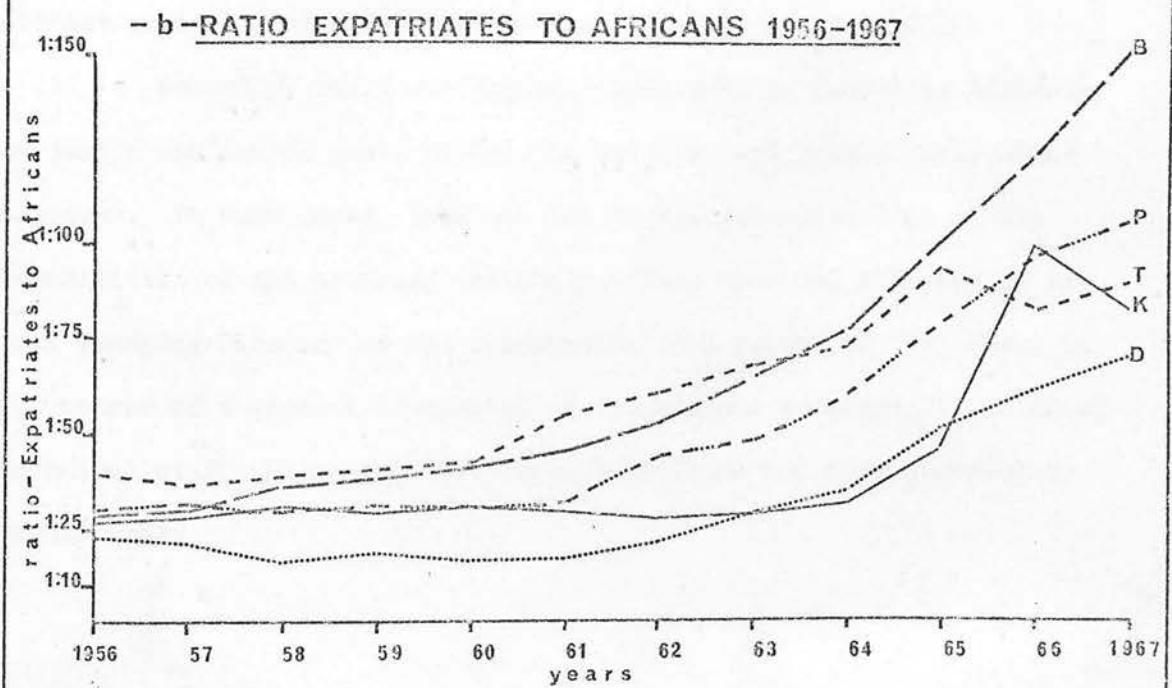
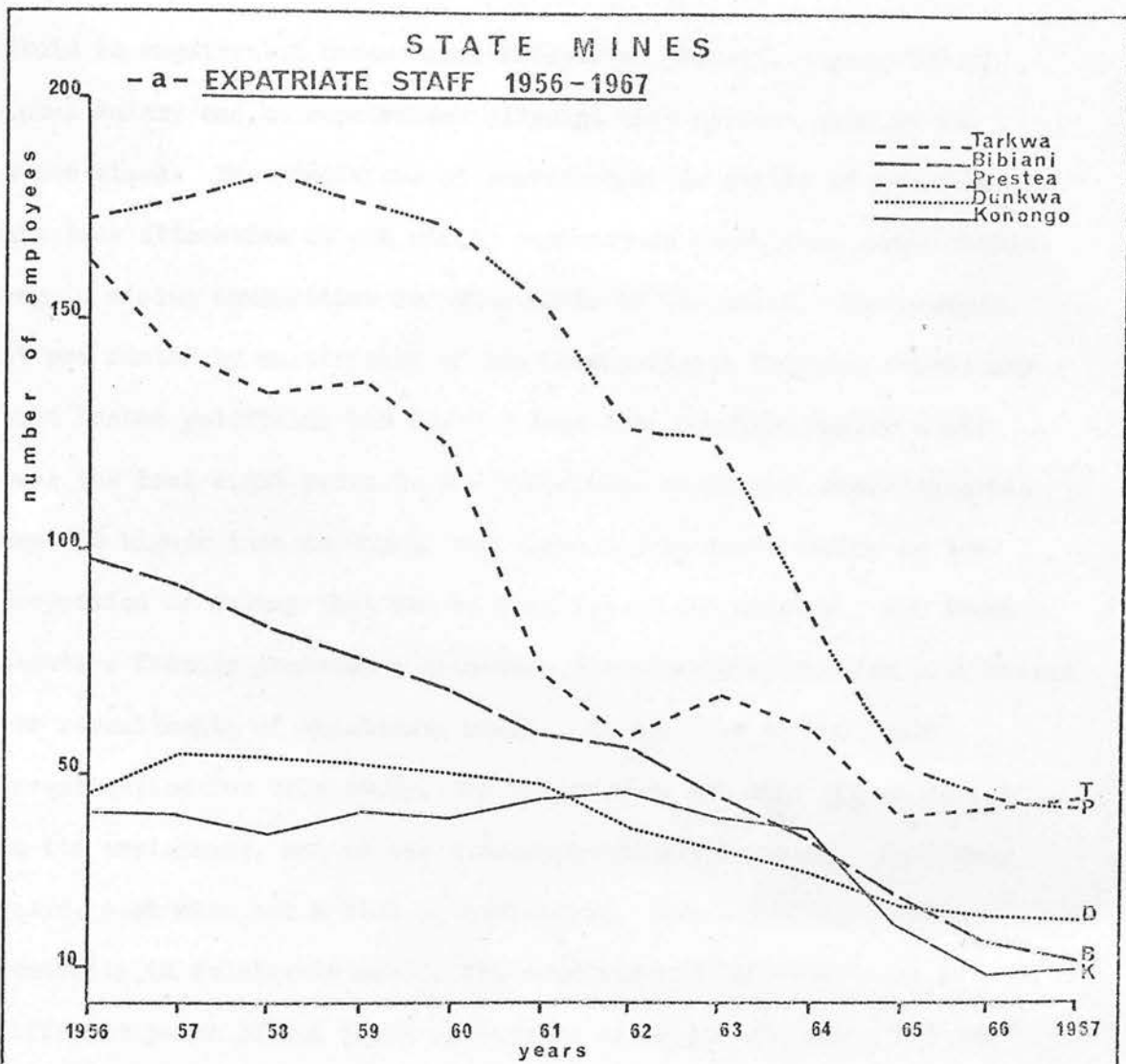
Indeed, since 1961 there has been no large-scale retrenchment of labour even when the production targets were not being met, nor seemed likely to be met. This policy was clearly demonstrated at the Bibiani mine. Owing to the exhaustion of ore it became clear that closure was inevitable and from the middle of 1965, a gradual scaling down of operations came into effect. Little or no labour was dismissed; the redundant labour was merely redeployed to the other subsidiaries of the Corporation, the majority to Tarkwa. Between January 1966 and March 1968, over 700 workers had been transferred from Bibiani; over half of these went to Tarkwa. It was considered that Tarkwa could most easily absorb the extra labour because of the size of its own labour force, but, in the light of the high degree of latent unemployment existing at Tarkwa, the logic of this seems doubtful. However, the transfer of these men from Bibiani demonstrates one of the main advantages of the amalgamation of the mines under one central administration, that the factors of production are readily mobilised between the subsidiaries as changing circumstances demand a change in the balance of factors at any

given time. The fact remains, nevertheless, that over-manning is characteristic of the State mines and contributes to the low level of productivity; this is discussed in a later section. In a developing country like Ghana, where employment opportunities are limited and unemployment rates high, it is generally regarded as commonplace to find that "... 'disguised' unemployment pervades the whole economy in varying degrees" (Myint, 1965, p.89).

2. Expatriates Employed

Secondly, there has been a decline in the numbers of expatriates employed in the industry in recent years (Fig.9.2a). There was a steady drop in their numbers from 1956 to 1960, but after takeover the rate of reduction increased markedly; less than half the total of 521 expatriates employed in 1956 were found on the State mines by 1965, when the number had fallen to 158. The stark drop in the expatriate component of the labour force has produced a significant structural change in the ratio of African to European employees (Fig.9.2b). In 1956, there was one expatriate to every twenty-nine African employees, and by 1967, the ratio had changed to one expatriate to ninety-seven Africans. This trend can be attributed to two main factors: the increasing dissatisfaction of the expatriates with conditions in Ghana, and the increasing pace of Africanisation in the country.

Dissatisfaction arose among the expatriate mining community partly as a result of the steep rise in the cost of living, combined with the shortage of consumer goods, which marked the immediate post-independence years in Ghana. Considerable inflationary pressure built up within the economy to 1965 and the national consumer price index rose by 37 points in one year alone from 1964 to 1965 (Economic Survey, 1965, p.101). In addition, restrictions on the amount of salary that



Source: S.G.M.C.

FIG 9-2

could be repatriated became more severe; at present, a mere 10% of total salary can be repatriated although this applies only to the State mines. The conditions of service and the scales of remuneration are less attractive in the mining industry in Ghana than those obtaining in mining communities in other parts of the world. For example, it was stated by an official of the Corporation's dredging subsidiary that Dunkwa goldfields has lost no less than fourteen senior staff over the last eight years to the tin-fields of Malaya, where salaries are 25% higher than in Ghana, and there are no restrictions on the proportion of salary that can be sent out of the country. All these negative factors produced a situation where resignations far outnumbered new recruitments of expatriate staff. At the time of the field investigation for this study, the Corporation had only one geologist in its employment, and he was a Russian-trained Ghanaian. In former years, each mine had a team of geologists. Since the world mining community is relatively small, the communication of conditions in different parts of the world appears to be relatively easy, and the State Gold Mining Corporation has found it increasingly difficult to attract expatriate staff in recent years.

Secondly, rapid strides have been made in promoting Africans to junior and senior posts within the industry and particularly after takeover. In some cases, this has led to the over-extension of the capabilities of the promoted nationals. This fact was attested by the then Managing Director of the Corporation in a report of 1965 when, in the course of a general discussion of the serious shortage of qualified technical staff, he stated that several Africans had been promoted to higher posts,

"... despite the fact that some of the African staff who have been promoted have not shown the qualities and drive required of them" (S.G.M.C.)

According to the quarterly reports covering the period June 1965 to March 1966, the number of Africans in senior and junior staff positions rose from 283 to 321 and from 744 to 1189 respectively. Every possible effort is being made to offer opportunities to Ghanaians to enter all the various positions in the industry. Training courses are available at the Tarkwa School of Mines, inaugurated in 1960; higher degree courses are available in various related branches of mining at the University of Science and Technology in Kumasi; and Government scholarships for study abroad, at the Camborne School of Mines and elsewhere, are available.

THE GEOGRAPHICAL ORIGIN OF THE LABOUR FORCE

One of the most interesting and relevant aspects of the mines' labour force to the geographer is its origin. Very little detailed information has been collected on this subject, although there are many works dealing with more generalised aspects of migrant labour in Tropical Africa. Although economists traditionally treat labour as being rather immobile, this premise is not valid in many countries of the developing world, and particularly of West Africa, where labour displays a high degree of geographical mobility. Of Ghana, it has been noted that,

"There cannot be many countries in the world in which migrant labour is as important as it is in the Ghanaian economy" (Birmingham et al., 1966, p.131).

The following discussion will show to what extent the mining industry's labour force is part of the stream of migrants entering into and moving within Ghana in search of wage-earning employment. Since this theme is

but part of the whole work, it has been necessary to select only a few aspects as they are relevant to an understanding of the performance of the gold mining industry. The analysis is based on the examination of all the labour record cards obtained at each mine, at various times during 1968.

1. General Source Areas of Labour

According to the 1960 Census, of the total of male employed migrants, 2.9% were attracted to the mining industry. Migrants are diffused through every sector of the economy; 63.8% in agriculture; 8.7% in manufacturing; 5.5% in construction; 0.9% in electricity, water and sanitation; 6.1% in commerce; 4.3% in transport; and 7.9% in services. However, the traditional foci of migrants, agriculture and mining, are becoming secondary to the towns as destinations of migrant labour, as these statistics reveal.

The labour force in the gold mining industry is largely drawn from within Ghana, apart from a few migrants from other West African countries, the largest group being from Nigeria. Over 90% of the mines' labour force is Ghanaian, although this figure includes migrants from Upper Volta. Since they form part of the north-south stream of migrants, it was considered justified to include this group (represented largely by the Moshie tribe, who inhabit the frontier region between Ghana and Upper Volta) with Ghanaians of northern origin (Table 9.4). The small number of migrants from other countries is derived from Sierra Leone, Liberia, and the Ivory Coast to the west, and from Cameroon, Nigeria, Dahomey and Togo to the east. The relative numbers from each of these countries decreases significantly with distance from source to mine.

TABLE 9.4

SOURCE AREAS OF LABOUR EMPLOYED ON THE STATE MINES:
(BY % DISTRIBUTION)

	Ghana		Other Countries	Total
	North	South		
Tarkwa	46	42	10	100
Prestea	61	33	6	100
Bibiani	53	43	4	100
Konongo	49	48	3	100
Dunkwa	30	64	6	100
Totals	94%		6%	100%

The small fringe of international migrants apart, it is possible to reduce the complex mosaic of tribes working in the mining industry to two main groups, those from the north and those from the south. This division is based on the seven administrative regions of Ghana, the north comprising the Northern and Upper Regions, the south made up of the remaining five. This two-fold division corresponds to the broad geographical division of Ghana, valid from the point of view of physical or human geography (Dickson, 1968, p.686). This division has also practical implications in the distribution of work in the mining industry.

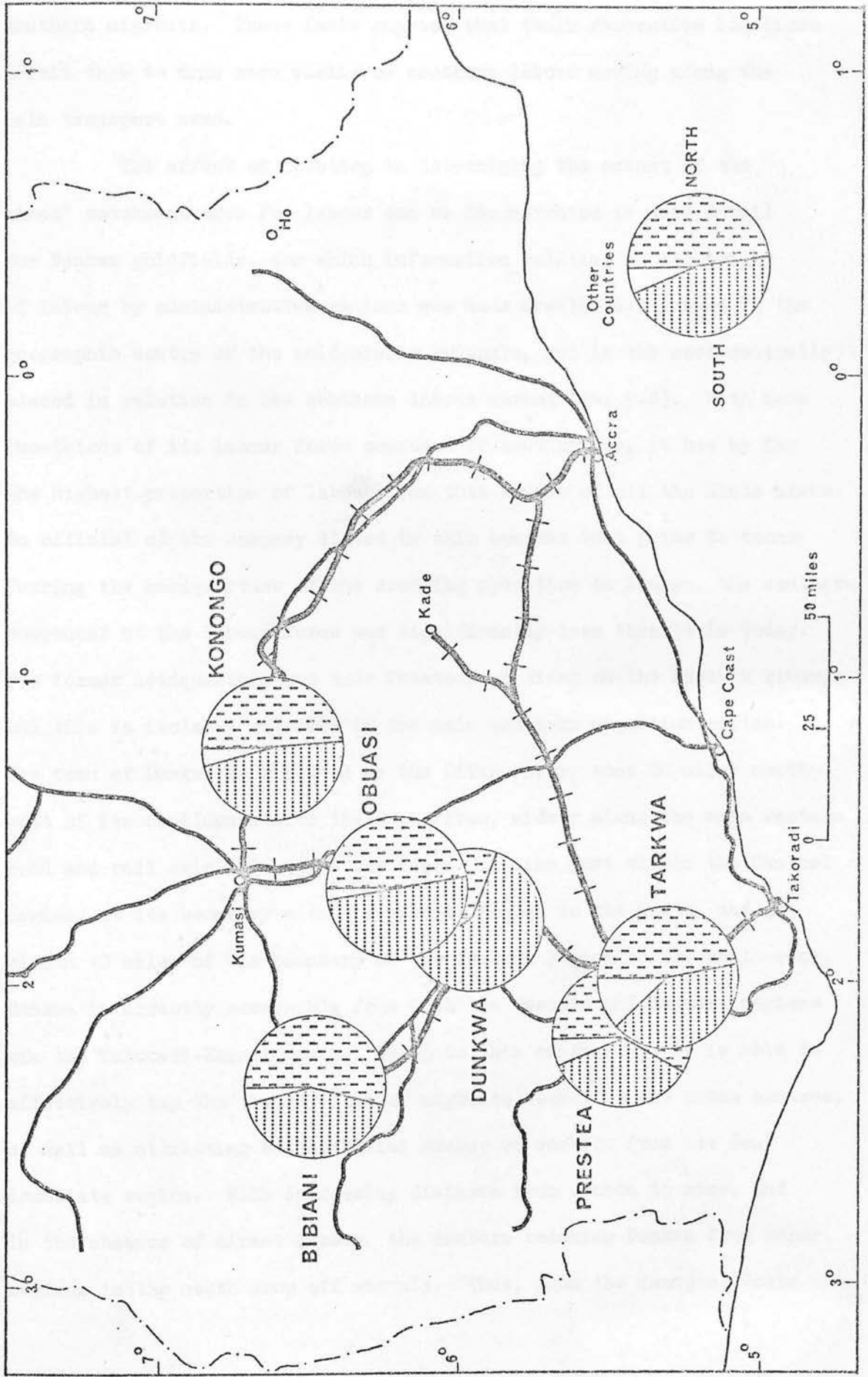
2. Distribution of Labour by Source

The most striking feature of the composition of the mines' labour force is the preponderance of northerners; more than half the labour drawn from within Ghana's borders is of northern origin. The relative proportions of northern and southern workers varies from mine

to mine, the highest northern component being found at Prestea, followed closely by Bibiani. At Tarkwa, there is a more even balance between the two groups, and at Konongo, the ratio is near 1:1. It is only at Dunkwa that labour of southern origin outnumbers that from the north in the ratio 2:1.

It is highly significant that the mines with the lowest proportion of labour from the south are those most isolated geographically from the main transport routes along which the southerners would travel in search of work (Map 9.1). It would appear that the compositional balance between the two groups at each mine bears a significant relationship to the location of each mine relative to the main inter-regional flows of migrants as they are determined by the transport network. Prestea's labour force has the lowest southern component, which comprises under one-third of the total labour force, whereas Tarkwa, only 18 miles to the south-east of Prestea, draws almost 45% of its labour from the south. This difference in the balance of the two groups can be attributed to location. Tarkwa sits astride the main road and rail axis linking Takoradi with Kumasi, and to Accra by the central railway. Prestea, on the other hand, can only be reached by a tortuous bush track, and a small feeder rail line. Thus, Prestea's pull on the southern migrant is effectively less. This reasoning applies equally to Bibiani, whose southern component comprises only two-fifths of its total labour force. Bibiani is some 20 miles from the nearest railhead at Awaso, and is linked to Kumasi by 54 miles of feeder road. Thus, Bibiani's pull on the southern migrant is similarly weakened by its eccentric location in relation to the main lines of communication in the south. By contrast, Tarkwa and Konongo are located astride major transport routes, and each had a more balanced ratio of northern and

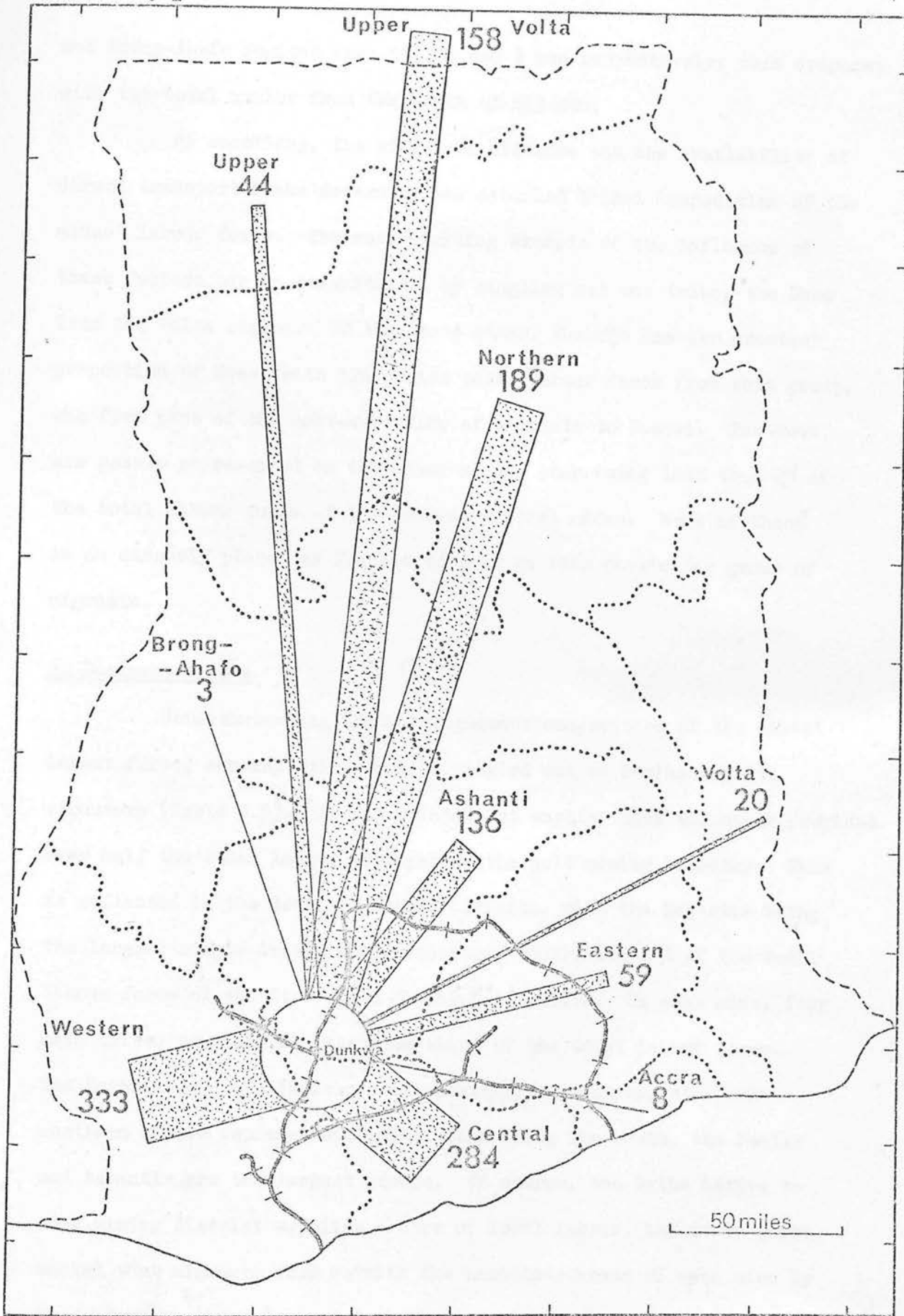
MAP 9-1



COMPOSITION OF LABOUR FORCE ON GOLD MINES: by source areas

southern migrants. These facts suggest that their respective locations permit them to draw more easily on southern labour moving along the main transport axes.

The effect of location in determining the extent of the mines' catchment area for labour can be demonstrated in more detail for Dunkwa goldfields, for which information relating to the origin of labour by administrative regions was made available. Dunkwa is the geographic centre of the gold-mining triangle, and is the most centrally placed in relation to the southern labour market (Map 9.2). With some two-thirds of its labour force composed of southerners, it has by far the highest proportion of labour from this source of all the State mines. An official of the company stated in this context that prior to transferring the headquarters of the dredging operation to Dunkwa, the southern component of the labour force was significantly less than it is today. The former headquarters was near Prestea, at Hiawa on the Ancobra river, and this is isolated relative to the main southern migration routes. The town of Dunkwa is situated on the Offin river, some 20 miles north-west of its confluence with the Prah river, midway along the main western road and rail axis which pass the town. It lies just within the Central Region, at its boundary with the Ashanti Region to the north, and is within 10 miles of the boundary of the Western Region to the south-west. Dunkwa is directly accessible from both the Western and Ashanti regions via the Takoradi-Kumasi route. Owing to this centrality, it is able to effectively tap the two-way flow of migrants between these urban centres, as well as attracting a substantial number of workers from its own immediate region. With increasing distance from source to mine, and in the absence of direct access, the numbers reaching Dunkwa from other regions in the south drop off sharply. Thus, from the Eastern, Volta



DUNKWA GOLDFIELDS: origin of labour

and Brong-Ahafo regions came 59, 20 and 3 men respectively; this compares with the total number from the south of 843 men.

By corollary, the effect of distance and the availability of direct transport links determine the detailed tribal composition of the mines' labour force. The most striking example of the influence of these factors can be demonstrated by singling out one tribe, the Ewes from the Volta region. Of the State mines, Konongo has the greatest proportion of Ewes, with 12% of its total labour force from this group, who form part of the east-west flow of migrants to Kumasi. The Ewes are poorly represented on the other mines, comprising less than 2% of the total labour force of the four deep-level mines. None of these is as directly placed as Konongo to draw on this particular group of migrants.

3. Dominant Tribes

Notwithstanding the heterogeneous composition of the mines' labour force, several tribes can be singled out as dominating its structure (Table 9.5). It was pointed out earlier that the north provides over half the total labour employed in the gold mining industry. This is reflected in the detailed tribal division, with the Dagartis being the largest single tribe in the industry, comprising 18% of the total labour force of the State Gold Mining Corporation. On each mine, four main tribes comprise at least one-third of the total labour force. The Dagartis and the Frafras are numerically the strongest of the northern tribes represented; and of those from the south, the Fantis and Ashantis are the largest groups. Of course, the tribe native to each mining district supplies a core of local labour, but it is quite marked that migrants from outwith the immediate areas of each mine by far outnumber those derived from the local surrounding villages. One

TABLE 9.5

DOMINANT TRIBES : BY MINE
NUMBERS AND PERCENTAGE TOTAL LABOUR FORCE

TARKWA	PRESTEA	BIBIANI	KONONGO
Dagarti 929	Dagarti 793	Dagarti 150	Ashanti 106
Fanti 555	Fanti 292	Ashanti 137	Ewe 88
Frafra 231	Wassaw 152	Frafra 90	Dagarti 71
Wassaw 223	Frafra 146	Fanti 86	Fanti 46
47%	30%	34%	48%

TABLE 9.6

PERCENTAGE DISTRIBUTION OF LABOUR : BY SECTOR

	<u>SURFACE</u>			<u>UNDERGROUND</u>		
	North	South		North	South	
Tarkwa	19%	81%	100%	68%	32%	100%
Prestea	40	60	100	70	30	100
Bibiani	47	53	100	70	30	100
Konongo	40	60	100	60	40	100

Source for both tables: Labour record cards at each mine.

final noteworthy aspect of the tribal composition of the labour employed on the mines is that of the seventy tribes which meet there, two of the largest tribes in the south are barely represented. These are the Brongs and the Gas. The Brongs inhabit the area of maximum cocoa production and the Gas are the natives of the Accra area. It is suggested that the small numbers of each of these groups found in the mining industry can be attributed to the greater employment opportunities in their home areas, which minimises the need to migrate in search of employment.

4. Distribution of Tribes by Sector

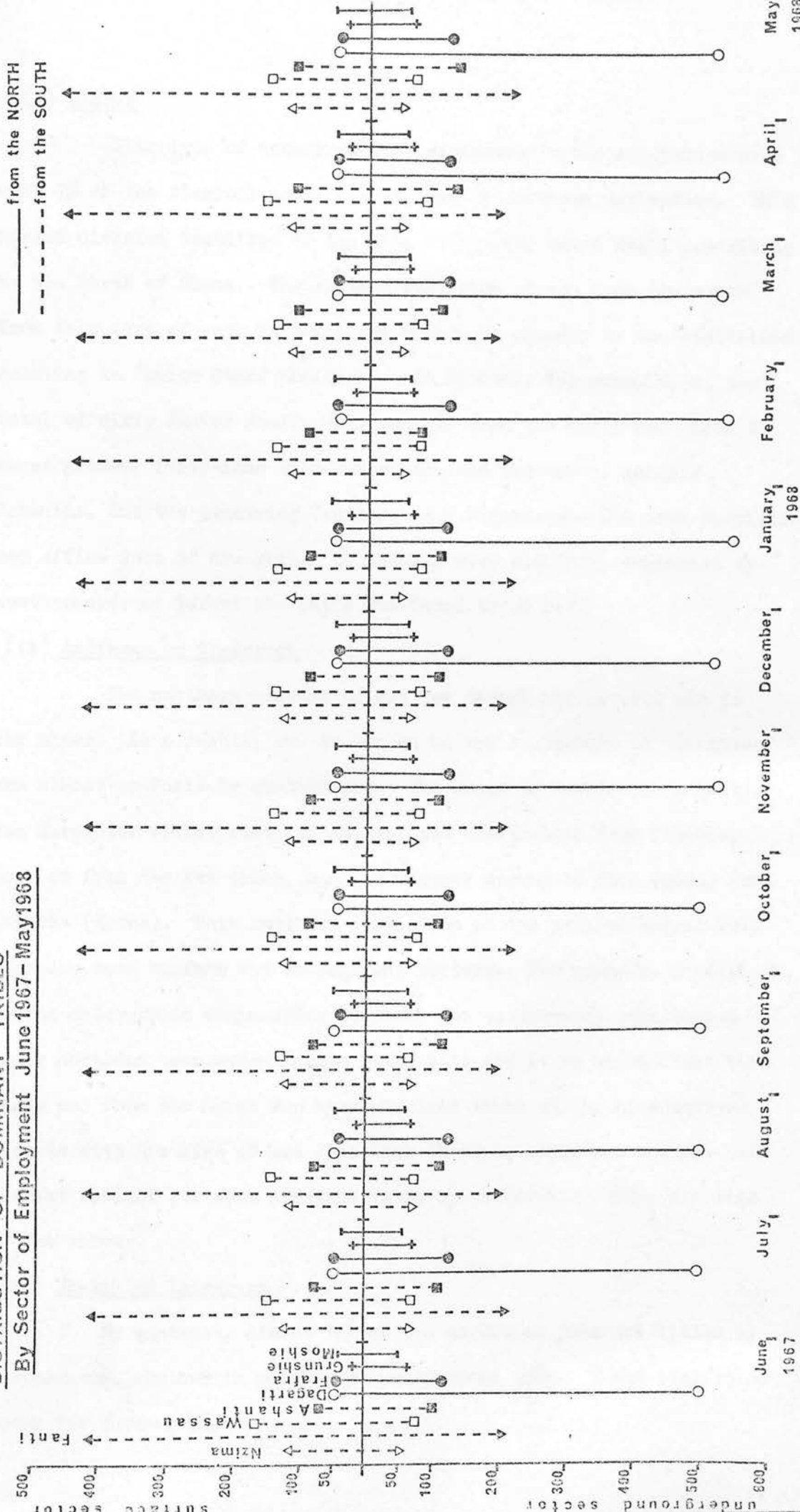
The two-fold division of labour by source areas becomes more meaningful when it is related to the division of labour by sector. The surface occupations tend to be dominated by southerners and the underground jobs are largely carried out by northerners (Table 9.6). In the case of the small fringe of international migrants, there is no distinct preference shown for either sector, and so they have been omitted from the calculations. The relationship between source area and work sector is shown in greater detail on a tribal basis for Prestea goldfields (Fig.9.3). The eight dominant tribes were identified, and the proportion of each tribe working in a surface or underground job plotted. The diagram tends to carry its own commentary, and it serves to summarise in graphical form many of the foregoing points.

5. Distribution of Tribes by Occupation

Further definitive patterns emerge from a more detailed analysis of occupational preferences. The most striking characteristic is that labour of southern origin dominates the skilled occupations and shows a greater occupational spread whether in the surface or underground

sectors, whereas the northerner is essentially the true 'labourer' in both sectors (Table 9.7). This conclusive evidence of the relationship between the geographical source area of an employee and the type of work he adopts on the mines reflects very clearly the regional opportunity differential between the North and South of Ghana in terms of the level of education and the level of development. The relative opportunities offered through these channels determine the level of skill a man can acquire in his home area. (For the influence of education on the occupational structure of migrants in Ghana, see: Engmann, 1969, pp.227-229 and Tables 10.17.2 & 10.17.3, p.229). The South has a much longer history of mass education and vocational training, fostered by the Basel Mission and the Colonial Administrators, who initiated artisan and clerical training respectively. The development of the South, based on the many readily-exploited resources of the forest zone, pressed the advantage on the southerner in every way. The North has taken second place in all spheres of development (see: Dickson, 1968, pp.686-696, for an elaboration of this theme). As a result of these historical factors, the northerner has remained economically backward and acquired few industrial skills from lack of opportunity. He is forced to migrate to the south for employment, but owing to his illiteracy and lack of manual skill, he is inevitably relegated to the role of 'labourer' on the mines. The occupational division in the mines' labour force between migrants from the south and north, into skilled and unskilled categories respectively, in fact follows closely the occupational distribution of these two groups in all other industries in Ghana (Birmingham et al., 1967, Vol.2, esp.Chapter 3). Three categories of work-type have been selected to illustrate this phenomenon in more detail as it occurs in the gold mining industry: these are clerks, artisans and unskilled labourers (see Table 9.7).

PRESTEA GOLDFIELDS
DISTRIBUTION OF DOMINANT TRIBES
 By Sector of Employment June 1967 - May 1968



(i) Clerks

This type of work is almost exclusive to the southerner with only 7% of the clerical posts held by men of northern derivation. This marked division testifies to the high illiteracy rates still prevailing in the North of Ghana. The virtual exclusion of men from the north from this type of work is borne out even more clearly by the statistics relating to Junior Staff positions. At Bibiani, for example, of the total of sixty Junior Staff, only two men from the north had risen to these grades, forty-four were Ghanaians from the south, largely Ashantis, and the remaining fourteen were Nigerians. The more specialised office jobs of draughting or tracing were similarly dominated by southerners; at Tarkwa the ratio was found to be 8:1.

(ii) Artisans or tradesmen

The northern migrant brings few manual skills with him to the mines. As a result, the tradesmen in the employment of the mines are almost exclusively southerners. The Mason is invariably a Fanti, the Carpenter either Fanti or Ahanta, the Electrician from Nigeria, Togo or from the Ewe tribe, and the Riggers appear to come solely from Liberia (Kroos). This southern domination of the skilled manual work pervades both surface and underground sectors. For example, at Bibiani, in the underground engineering section, the southerners outnumbered their northern countrymen in the ratio 8:1, and it is significant that those men from the north who have acquired these skills have service records with the mine of not less than thirteen years and one man had been at Bibiani for some nineteen years up to November 1968, the time of the survey.

(iii) Unskilled Labourers

By contrast, almost 70% of the unskilled jobs are filled by northerners, whether in surface or underground jobs. These statistics speak for themselves.

TABLE 9.7

TRIBAL/OCCUPATIONAL DIVISION : SELECTED INDICATORS

		Clerks	Artisans	Unskilled Labour
Tarkwa	N	9	11	879
	S	95	299	389
Prestea	N	3	11	742
	S	46	39	512
Bibiani	N	1	5	391
	S	16	43	161
Konongo	N	-	3	279
	S	13	35	127
TOTALS	N	13	30	2291
	S	180	416	1189
%TOTALS	N	7%	7%	68%
	S	93%	93%	32%

N = Northerner. S = Southerner.

Source: Labour record cards.

LABOUR AS A FACTOR OF PRODUCTION

Having concentrated the discussion up to this point on the structure of the mines' labour force in quantitative terms, the qualitative aspects are clearly related, and perhaps more significant to the analysis of the contemporary performance of the gold mining industry in Ghana. The qualitative aspects involve a consideration of such factors as the stability of labour, the turnover and absenteeism rates that obtain and the productivity of labour; all of these elements bear on the efficiency of labour as a factor of production. Having established that the gold mines depend to a large degree on migrant labour to fulfil their requirements, this raises the question of the extent to which the industry has been able to overcome the inherent disadvantages of reliance on this type of labour. Has the full sequence of "recruitment, advancement, maintenance and commitment" been achieved? It is suggested that three criteria can be used as indicators of stability or otherwise: the length of stay, turnover and absenteeism.

I. Length of Stay

In the context of migrant labour, there are two aspects to be considered as they affect the stability of the labour force: the permanent migrant and the temporary migrant. The permanent migrant is one who, once recruited, settles down in his place of employment, acquires a degree of proficiency, and accepts full entry into the wage-earning economy. The temporary migrant is one who stays a short time in the industrial economy before returning home with his earnings. The former provides the desired stability, the latter detracts from it.

There is evidence to suggest that both types of migrant are found on the mines, where there is a small permanent core with a wide

fluid fringe of temporary migrants. Records relating to the length of stay are not directly available, since each man takes his labour card with him on termination of employment. However, by using the current record cards, on which the date of engagement is recorded, it is possible to get some measure of the general trend; the results are tabulated on Table 9.8. No information of this kind was available at Dunkwa or Konongo.

TABLE 9.8

DATE OF ENGAGEMENT OF LABOUR : SELECTED TIME INTERVALS

	pre-1940	1941-50	1951-60	1961-65	1966-68
Tarkwa	4	110	470	1102	2302
Prestea	3	78	537	772	1135
Bibiani	9	92	376	429	25

At the time of the survey (1968), between 40% and 60% of the employees had service records of two years and under; less than one-third had records of three to seven years of service, and the remainder had longer services of employment although the numbers diminish rapidly with the number of years. An almost insignificant core of workers had been engaged before 1950, giving them service records of some twenty years. It is pertinent to ask whether there is any significant difference between the northerners and southerners in respect of length of stay in the industry. A closer examination of the figures revealed that labour originating in the north tended to have shorter periods of service than its southern counterpart. For example, the Bibiani records showed that, although there was no significant difference between the length of stay of the two groups in the surface sector,

there was a marked difference in the underground workers' service periods of service; over half of the southerners in underground jobs had been engaged prior to 1961, whereas over two-thirds of the northerners had been engaged after 1961. Similarly, at Tarkwa, the new engagements made in the first nine months of 1968 represented some 10% of the total labour complement at September 1968; of this 10%, 8% were from the north and all were engaged in the underground sector. This pattern seemed typical throughout the industry and was corroborated by officials on the mines. From the available data, it therefore appears that the greater instability occurs in the underground sector, which is largely the domain of the northern migrant. More direct evidence of this instability can be gained from statistics relating to turnover, and it is clearly related to length of service.

2. Labour Turnover

It has frequently been alleged that high rates of labour turnover are characteristic of the labour situation in West Africa, as a direct result of the predominance of temporary migrants in the work-force (see particularly, I.L.O. African Labour Survey, 1958; Galenson, 1959). Some attribute the high turnover rates to the "low satisfaction level of labour", in the sense that, once he has saved some predetermined sum of money, he returns home having fulfilled his objective, while others conclude that the high turnover is due to the sheer love of changing jobs (Seers-Ross Report, 1952).

According to the information pertaining to the mining industry, it is apparent that, while high, labour turnover is not as high as is commonly supposed (Table 9.9). Some officials of the gold mining industry quoted figures of up to 200% for turnover, but the records did not bear out these verbal estimates. The average rate of annual turnover for 1967 was some 40%.

TABLE 9.9

LABOUR TURNOVER 1967 : BY SECTOR

	Under- ground	Surface	Total
Tarkwa	81%	43%	62%
Prestea	55%	22%	39%
Bibiani	50%	22%	36%
Konongo	54%	18%	39%
Dunkwa		18%	18%

The statistics reveal that the highest rates of labour turnover are found in the underground sector, and in the light of the previously established fact that it is the northern migrant who dominates in this area, it would seem likely that it is this element in the labour force which is largely responsible for the higher number of unit changes underground. By using Spearman's Rank Correlation to test for any statistical relationship between turnover and the northern component in the labour force, a result of .9500 was obtained. This tends to suggest that there is a definite relationship between the two variables, and the high statistical correlation obtained could be assumed to confirm the general assertion that the migrant from the north comes south for only short periods of employment and returns home at the harvesting season in the north, when his labour is required in the fields. Being largely unskilled, the employee from the north is naturally more mobile, first of necessity and secondly, from his unawareness of conditions from one job to the next. An examination of the labour record cards revealed a very high tendency for the unskilled worker to change his job on the mine with remarkable frequency; there

were numerous cases of weekly transfers from one department to another, from surface to underground and back to surface. This has also been found to be typical of the building industry in Ghana (Seers-Ross Report, 1952, p.98). The current rates of turnover in the gold mining industry show a decided improvement over previous years. In 1948, the rate of turnover in the underground sector was estimated to be some 90%, and in 1955 some mine managers estimated the turnover was as high as 150% per annum (1956 Board of Enquiry, p.36). Notwithstanding these recent improvements, an average of 40% is still high, and there can be little doubt that the productivity of labour would show an improvement of a more stable labour force could be secured, with all the attendant advantages derived from a long term interest in the job, the reduced cost of initial training and the greater efficiency of cumulative experience.

3. Absenteeism

A third measure of the stability of the mines' labour force can be derived from a study of the rates of absenteeism. Absenteeism has also attracted considerable attention as a factor responsible for the general instability of labour in West Africa, but the allegations of high rates of absenteeism are rarely substantiated by factual evidence. In the Report of the Mines Board of Enquiry (1956) it was suggested that there were three possible causes of absenteeism in the mining industry: occasional farming, funerals, and sickness.

From the available evidence for the gold mining industry, it appears that absenteeism is much lower than is commonly supposed (Table 9.10). It was possible to distinguish two elements of absenteeism. These are voluntary absenteeism (or the habit of not turning up to work for no apparent logical reason) and involuntary absenteeism (or those not at work for genuine reasons of illness or on leave with pay).

TABLE 9.10

PERCENTAGE ABSENTEEISM ON STATE MINES : 1967-68

	<u>Voluntary</u>		<u>Involuntary</u>		<u>Total not at work</u>	
	U	S	U	S	U	S
	Tarkwa	6.0	1.5	10.0	6.5	16
Prestea	2.5	2.1	7.5	6.4	10	8.5
Konongo	2.0	3.5	6.0	2.5	8	6
Bibiani	1.4	1.6	6.6	8.4	8	10

U = Underground. S = Surface.

These figures show that voluntary absenteeism is fairly low and certainly much lower than involuntary absenteeism. The total rate of absenteeism is still less than 10% of the total book-strength of the labour force. On the larger mines, the trend seems to be that a higher number of man-days are lost through voluntary absenteeism in the underground sector, whereas on the smaller mines, as Bibiani and Konongo, the reverse is true. On the average, therefore, absenteeism is insignificant although in the earlier period much higher rates were recorded. For example, in the Report of the 1953 Mines Labour Enquiry Committee, it was indicated that the annual rate of absenteeism for the gold mining industry in 1952-53 was in the range of 3%-20.5% for the surface sector and from 3% to 29% for the underground sector.

Of the three criteria chosen to measure instability, it appears that absenteeism is a relatively minor problem compared to the short service periods and the related high turnover in the labour force. It seems that over eighty years of commercial gold mining has done little to stabilise labour in the mining industry, despite the efforts of the

mining companies in that direction through the provision of housing, welfare, medical and recreational facilities on the mine camps. The dependence of the mines on migrant labour remains a fundamental fact, and the recruiting system does little to offset this basic problem. No formal recruiting procedure has yet evolved, and no formal contracts between employer and employee bind the employee to a predetermined length of service in the industry, such as is the case in the South African gold mining industry. Labour is engaged through the local labour exchange which advertises the vacancies in the mining industry as they arise. Once recruited, having passed through the security and medical procedures, a man is not bound to stay in the employment of the mine if he chooses to do otherwise.

4. Labour Productivity

Finally, the productivity of labour in the mining industry is clearly related to the foregoing factors. An examination of the labour force from the point of view of its productivity is perhaps the most important qualitative dimension by which to judge the performance of the gold mining industry inasmuch as labour is a factor of production. Of the national labour force, it has been said that Ghana's most serious manpower problem is "the widespread under-utilisation and low productivity of the labour force" (Survey of High-Level Manpower, 1961, p.15), and a comparison of labour productivity on Ghana's gold mines with that of similar mines in other parts of the world, suggests that the gold mining industry is no exception. For example, in 1955, it was found that labour productivity at Amalgamated Banket Areas was only two-thirds as high as at similar-sized mines, working the same type of deposit, at comparable depths, in South Africa, and only one-seventh as high as in the Australian gold mining industry. It is suggested that the best

way of assessing the current level of productivity is to analyse the trends in productivity in the industry over a wider timespan, covering the period 1956 to 1967; this will also allow a comparison of the situation pre- and post-takeover.

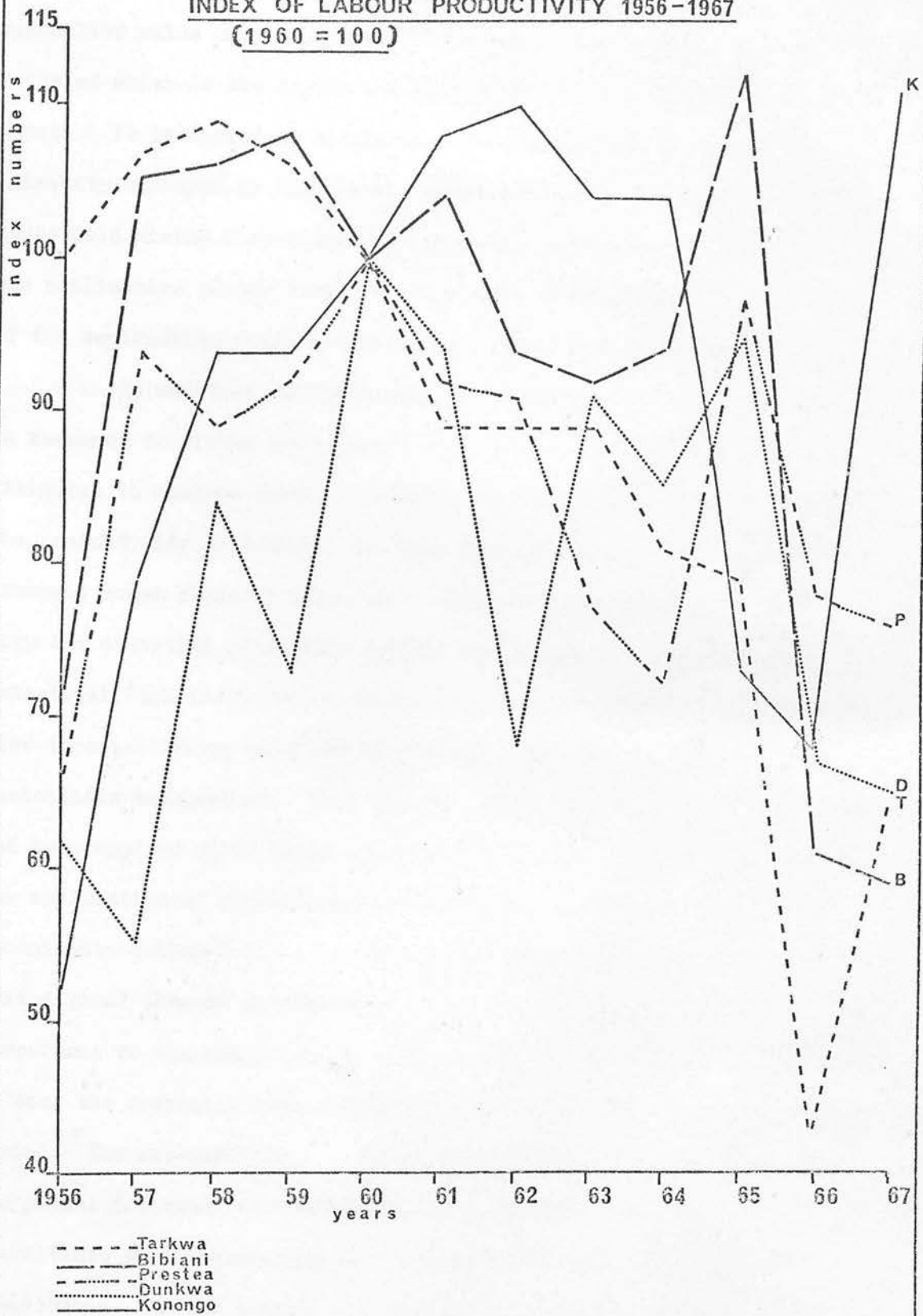
As is demonstrated on Fig.9,4, two trends can be identified and these correspond to the pre- and post-takeover periods. From 1956 to 1960, gradual increases in the labour productivity ratings were recorded, but after 1961 this trend was reversed, and labour productivity deteriorated. It will be recalled that a similar pattern was described for the production of the industry over the same period (Chapter 8). This raises two questions: What were the stimuli to the higher rates achieved in the late 1950s? and What were the constraints of the 1960s which influenced the reversal of the trend? It is suggestive that two inter-related variables, the relative scale of mining operations and the relative capital-intensities employed in each period, were largely responsible for the contrasted performance of the labour force in the pre- and post-takeover years.

In considering the scale of mining operations, it seems that any increases in production were matched by similar increases in the productivity of the labour force, and in the extreme cases, the years in which peak production was attained were the years in which labour productivity ratings also reached a peak level; conversely, the nadir year for gold output corresponded to the year of lowest output per manyear. It would therefore appear that, all other things being equal, trends in output and output per manyear moved in harmony. Hence, the contraction of output of the State mines after 1961 can help to explain the deterioration in labour productivity, especially when combined with the fact that employment was maintained at a higher level than was

STATE MINES

INDEX OF LABOUR PRODUCTIVITY 1956-1967

(1960 = 100)



Source: S.G.M.C. unpublished

FIG 9.4

necessary for the scale of operations. Labour can maximise its potential productive value only when combined with other co-operant factors, not least of which is the supply and quality of capital aids or production inputs. It is therefore suggested that the difference in capital-intensity employed by the private companies and their successor, the State Gold Mining Corporation, in the administration of labour and in the utilisation of the total resource base, was a more important cause of the contrasting productivities achieved in the two periods.

In addition to increasing the scale of operations in the 1950s in response to rising production costs, the private companies also attempted to achieve further economies by adopting measures to increase the productivity of labour. To this end, the mines of the Finsbury Pavement House group of mines (sic. those involved in the takeover with the exception of Bibiani (1927) Ltd.) brought in a team of Industrial Consultants to undertake a 'time and motion' study, with a view to establishing patterns of control, based on the principles of 'scientific management'. This was the first time that these principles had been applied on so broad a front, and it was the first example of the application of highly sophisticated control patterns to what the Consultants called " ... primitive labour conditions as is found in West Africa" (Fraser and Somerset, 1958, pp.285-348). This was a costly investment to the companies; an official of the industry estimated that it cost the companies some £10,000 per month over the seven-year survey period. The end-result was a series of Manuals of Standard Practice, one manual for every section of the whole mining operation. The Consultants also recommended that a Planning Department should be established. As the trends in productivity ratings show, outstanding improvements were achieved, mining methods and general organisational

procedures were streamlined and the productivity of labour rose as a result. Considering that these standards laid down in the Manuals were applicable regardless of the scale of operations, the question arises as to why the labour productivity fell at such a steep rate after 1961. It appears that many of the principles were abandoned with the change in administration. At Tarkwa goldfields, for example, according to all the interviewees, the Manuals of Standard Practice were abandoned for no explicable reason, and the labour control system dictated by the principles of scientific management was reintroduced only in the last quarter of 1968. At that stage, it was expected that it would be some months before the benefits of the re-established labour controls would show in the productivity ratings of Tarkwa goldfields. In light of the positive improvement in labour productivity achieved in the 1950s by the application of these standards, it seems fairly certain that their removal in part or whole after 1961 partly explains the poor performance of the labour force in the gold mining industry in Ghana in the 1960s.

In addition, a further stimulus to the level of output per man-year achieved in the late 1950s was the increased mechanisation in the gold mining industry in this period. A man's output is determined in no small measure by the tools at his disposal. Wherever possible, therefore, mechanisation was adopted, and this enhanced the productive value of the labour force; diesel and electrically-driven locomotives were introduced, and trucks and mechanical loaders replaced hand-tramming. Amalgamated Banket Areas Ltd., for example, installed new equipment to the value of £1,850,000 in an effort to increase the productivity of its work-force. Given this high level of mechanisation at takeover, the immobility of much of that equipment owing to the shortages of spares,

stores and other essential materials, explains the magnitude of the decline in labour productivity after 1961.

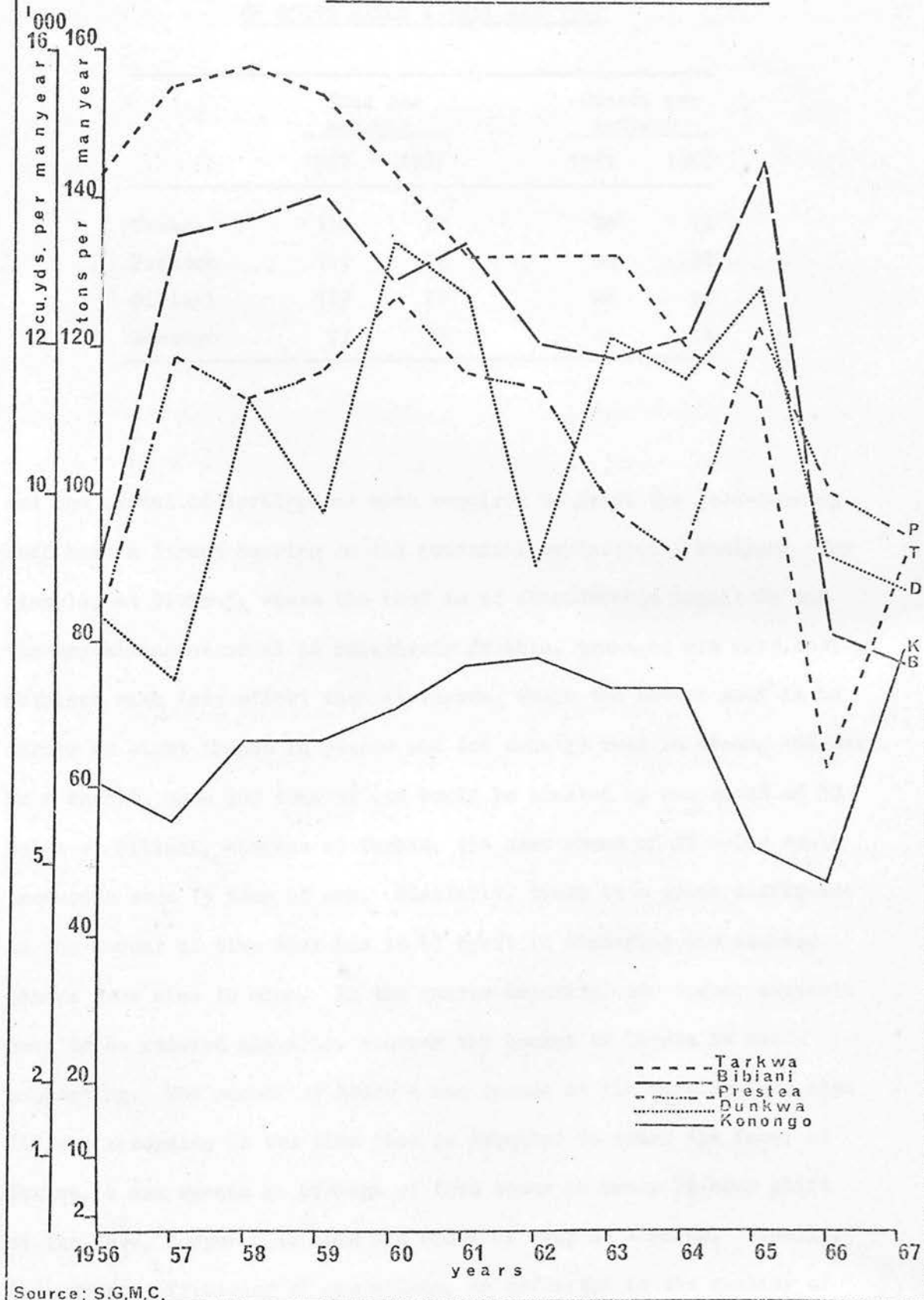
Finally, there was one additional factor which contributed to the deterioration of productivity after takeover and this was the removal of the monthly bonuses to the shift-bosses. It was agreed by all the mine managers that this was one economy that was unjustified in that it had a marked adverse effect on output. The dilution of expert supervision owing to the decline in the expatriate staff numbers after 1961 and the concomitant promotion of nationals without the necessary experience or indeed authority over their fellow-countrymen, were secondary factors. Suggestions of nepotism, tribal favouritism and allegations of corruption in promoting nationals to higher posts were almost too frequent to be dismissed, but proved impossible to substantiate.

As a corollary, it is notable that at any one time, vastly different levels of productivity obtain from mine to mine (Fig.9.5). Any comparative analysis of productivity is beset with difficulties since a wide range of factors must be considered; the grade of ore, the geological conditions which determine the method of mining that can be adopted and the extent of the development work required, the size of the mining operation and the efficiency of operations are all relevant factors. A comparison of labour productivity, as measured by tons per manyear and gold produced per manyear, gives, in fact, almost diametrically opposite rankings for the four deep-level State Mines (Table 9.11).

These statistics reveal the inter-relationship between the grade of ore mined and the size of mining operations as they affect labour productivity. Similarly, the particular geological conditions

STATE MINES

OUTPUT PER MANYEAR 1956-1967



Source: S.G.M.C.

FIG 9.5

TABLE 9.11

COMPARATIVE LABOUR PRODUCTIVITIES
ON STATE MINES : 1961 and 1967

	<u>Tons per</u> <u>manyear</u>		<u>Ounces per</u> <u>manyear</u>	
	1961	1967	1961	1967
Tarkwa	132	72	28	13
Prestea	119	96	38	30
Bibiani	129	71	26	11
Konongo	77	79	41	34

and the amount of development work required to reach the gold-bearing reef have a direct bearing on the numerical productivity ratings. For example, at Bibiani, where the reef is of considerable magnitude and the containing material is relatively friable, tonnages are more easily obtained with less effort than at Tarkwa, where the blanket reef is as narrow as eight inches in places and the country rock is strong and hard. As a result, some 500 tons of ore would be blasted by one round of 30 holes at Bibiani, whereas at Tarkwa, the same round of 30 holes would produce a mere 15 tons of ore. Similarly, there is a great difference in the amount of time that has to be spent in timbering the working places from mine to mine. In the quartz deposits, the timber supports have to be renewed annually, whereas the blanket at Tarkwa is self-supporting. The number of hours a man spends at the working face also differs according to the time that is required to reach the face; at Tarkwa, a man spends an average of five hours in every $7\frac{1}{2}$ -hour shift at the face, compared to some six hours or over at Konongo. Finally, the general efficiency of operations, as reflected in the quality of

management and supervision of the labour force must affect its productivity. In this context, continuity of management is desirable, and it is noteworthy that Tarkwa goldfields, the mine with the poorest performance since takeover, had no less than fourteen different managers between 1956 and 1968. It was also recognised that one of the main causes of the declining productivity at Tarkwa was due to the misapplication of available labour, the concern of the senior staff and the labour control organisations. The complex inter-relationship of all these factors as they bear on the productivity of labour, therefore, makes a comparative analysis of labour productivity between the mines of the State Gold Mining Corporation rather meaningless. The only definitive feature in this context is that, in each and every case, the productivity of labour improved in the years before takeover, and deteriorated thereafter, the reasons for which have been outlined earlier.

CONCLUSION

It was stressed at takeover that the Government's prime objective was to maintain employment in these long-established mining communities. Since 1961, the State mines have employed an annual average of some 13,000 daily-rated workers, and disbursed over £14,000,000 in wages (Table 9.12). The gold mining companies have always provided a wide variety of housing, welfare, medical and recreational facilities for the workers in an attempt to induce stability; the cost of the provision of these services to the State mines amounted to over £10,000,000 between 1961 and 1967 (Table 9.13). None of the mines has yet sufficient accommodation to house all the workers (Table 9.14).

TABLE 9.12

WAGES PAID TO DAILY-RATED LABOUR BY STATE MINES : 1961-1967

	Tarkwa	Prestea	Bibiani	Dunkwa	Konongo*	Total State Mines
	£	£	£	£	£	£
1961	732,894	631,602	408,562	142,261	-	1,915,319
1962	695,626	629,589	422,914	168,344	-	1,916,473
1963	801,593	810,867	455,351	159,138	-	2,226,949
1964	848,706	865,426	469,311	188,676	-	2,372,119
1965	800,000	855,702	441,441	199,256	-	2,296,399
1966	750,084	658,960	457,017	215,275	100,000	2,181,336
1967	602,460	614,661	286,956	198,437	93,538	1,796,052
Total State Mines 1961-1967						£14,704,647

* in private ownership until 1965.

Source: Ghana Chamber of Mines, Annual returns of the member companies.

TABLE 9.13

COST OF SANITATION, HOSPITAL AND MEDICAL SERVICES:STATE MINES, 1961-1967

	Tarkwa	Prestea	Bibiani	Dunkwa	Konongo	Total State Mines
	£	£	£	£	£	£
1961	39,869	45,638	21,529	11,784	-	118,820
1962	44,241	56,487	22,738	14,773	-	138,239
1963	46,297	137,261	23,548	13,887	-	120,993
1964	55,494	28,090	28,529	18,393	-	130,506
1965	60,000	60,631	23,451	18,007	-	162,089
1966	66,394	64,580	24,100	19,460	16,941	191,475
1967	49,402	51,400	23,000	15,000	16,000	154,802

Source: As for Table 9.12.

TABLE 9.14

HOUSING FOR EMPLOYEES OF STATE MINES:
as at September 1967

	Number of rooms	Number housed	Number workers	% Housed
Tarkwa	2023	1984	4271	46%
Prestea	1348	1034	4528	23%
Bibiani*	1731	1542	1411	100%
Dunkwa	812	775	1155	24%
Konongo	249	155	649	29%

* Bibiani's labour force had been cut by 50% after 1965.

Because of the inadequacy of housing provided by the mining companies, the Central Government built housing estates in the mining areas to alleviate the problem of high rents charged to the miners in nearby villages, where miners paid from 35s to £2 per month for a room compared to the nominal monthly charge of between 2s 6d and 5s charged by the mines. Much of this investment would have been rendered immobile had the marginal mines closed, since these mining towns could not offer employment on a comparable scale. In addition, plots of land are made available to any employee who wishes to take up permanent residence in the mining districts, but despite these measures, labour turnover remains high largely owing to the high proportion of temporary migrants in the labour force.

In Ghana, where unemployment is one of the main political and economic problems, the implications of the sudden loss of thousands of jobs are obvious, but the problem should be kept in perspective, since it is only the semi-skilled and unskilled categories of labour that

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In Ghana, where unemployment is one of the main political and economic problems, the implications of the sudden loss of thousands of jobs are obvious, but the problem should be kept in perspective, since it is only the semi-skilled and unskilled categories of labour that

would have faced unemployment over a long period. As T. Killick pointed out in this context,

"Skilled craftsmen are in very short supply in the country, and as long as the skills learned in the mining were applicable to other forms of industrial activity there should not be much difficulty in finding new jobs for the 3500 workers in this category" (Birmingham et al., 1966, p.274).

However, what Killick failed to take into account were the wider social implications of the closing of these mines. The mining towns supported a combined population of some 63,000 inhabitants in 1960, and they had grown at the expense of the smaller villages in the wider hinterlands of the mining areas. Rural depopulation resulted over a long period as people drifted to the mining towns to earn a livelihood from the market potential offered by the geographical concentration of spending power at these points. The mining towns today have acquired an urban character and offer a wide variety of services quite atypical of the other settlements in their respective regions. (For the influence of modern mining on the settlements in the mining areas of Ghana see: S.A.Darko, 1962).

The phasing out of active mining operations at the Bibiani mine bears living witness to the social disruptions caused by closure. At the time of the field survey, the majority of the rooms in the housing compound were empty and in bad repair, since a large number of workers had by then (November 1969) been transferred to other subsidiaries, and the miners' village had a 'ghost town' appearance. The local population were extremely concerned about the imminent closure of the mine since the mine had been the 'lifeblood' of that area for so long. There were suggestions of trying to attract other labour-intensive industries into the area, such as a match factory based on the local timber resources, but owing to the geographical isolation of Bibiani, it is unlikely that any industry employing labour on the scale of the

Bibiani mine will be located there. There are sizeable bauxite deposits in the nearby Yenahin area, but it is doubtful whether the Corporation could finance their investigation, or whether the Government is likely to sanction such a project, particularly in the light of the more extensive bauxite deposits in the Kibbi area in the Eastern region, to the north of the Volta dam, which are currently being surveyed with a view to eventual exploitation. The future of the Bibiani area is as yet, therefore, unresolved. Another aspect of its closure that was causing concern was the possible closure of the mine's hospital at Bibiani. This serves an estimated population of some 22,000 inhabitants drawn from the wider hinterland. It is thus a social asset to the local region and not merely a mine service. This applies equally to the other mines which together account for some 6% of the total hospital beds in the country, and in their local regions have a greater social significance than that figure suggests. It is, therefore, in these broader social terms that the implications of the Ghana Government's support of the gold mining industry can be understood.

CHAPTER 10

THE ECONOMICS OF GOLD MINING IN GHANAINTRODUCTION

In the two preceding chapters, the contemporary performance of the gold mining industry in Ghana was discussed in the light of the Government's policy towards the marginal mines. It was shown that at takeover in 1961, two of the private gold mining companies were near collapse and the others involved in the takeover were fast approaching the point where operations would no longer be profitable. In these terms, the fall in their total yield which occurred after 1961 was to be expected, and only the State could face up to imminent losses to get the much needed revenue from gold and to ensure maximum employment in the mining districts. The rationale of keeping open marginal enterprises by public subsidy can, therefore, be understood in these terms. It is the purpose of this final chapter to investigate the extent to which the Government has had to subvent the mines of the State Gold Mining Corporation since 1961, and to assess the benefits fed back into the economy as a result of this support. But first, it is relevant to comment on the economic situation of the gold mining industry in the world context in order to put the economics of gold mining in Ghana into perspective.

The world gold mining industry suffers peculiar economic problems which derive from the nature of the world market for its product. The extent of the market for any mineral is generally indicative of the economic condition of the industry in the producing country, but gold occupies a unique position in that demand for it never abates. The faith of centuries in the incomparable strength of gold as

a medium of international exchange has been maintained by virtue of its scarcity in economic concentrations and its high cost of production. Gold thus has an assured market, but the producer is at the great disadvantage that the price for his product is more or less static at the exchange price of 35 US dollars per ounce, fixed in 1934. This price is totally unrealistic in relation to current operating costs in most of the gold-producing countries. The fact that the United States Government is obliged, by legislation, to buy gold at this fixed rate provides a floor price for gold on the world market, and this price, less freight and other charges required to ship gold to New York, gives the 'shipping parity' price. If the price of gold falls on the other bullion markets below 35 US dollars per ounce (or its equivalent in other currencies), it pays the supplier to ship to New York. Under the International Monetary Fund Agreement, no member country party to the agreement can buy or sell gold outside the limits of 1% above or below parity. This has the effect of maintaining the price of gold per ounce at between 247s 6d and 252s 6d sterling equivalent. The price of gold is, therefore, highly institutionalised. Apart from the government buyers, a free market exists to serve the needs of industry and private buyers, but the price obtained in the free market rarely rises high enough to upset the official price. In March 1968, a 'two-tier' price system was introduced under which members of the gold pool decided that henceforth their holdings of gold would be available for monetary purposes only and that a free market would be permitted to operate. The free market price for gold reached a record level of 44 US dollars per ounce in May 1969, but subsequently it has drifted down to the official price level. The slight improvement over the official price of gold since the introduction of the two-tier system has been of

particular advantage to the low-grade gold mines in that the increased revenue has enabled them to offset to some extent the endemic inflation in operating costs, but in the majority of cases, operating costs stand close to or above either the officially fixed price or the higher free market price of gold per ounce. It is estimated that half of the free world's gold is costing about 35 US dollars per ounce to produce. In North America, the cost of gold production averages between 30 and 34 US dollars per ounce, but elsewhere it cannot be mined for much less than 35 US dollars per ounce. Even some of the South African mines are in the marginal category with operating costs between 33 and 34 US dollars per ounce, although generally costs average between 8 and 15 US dollars, a level which is achieved only through economies of scale. By contrast, in India, the Philippines and on the poorer State mines of Ghana, the cost of producing one ounce of gold reaches between 45 and 55 US dollars.

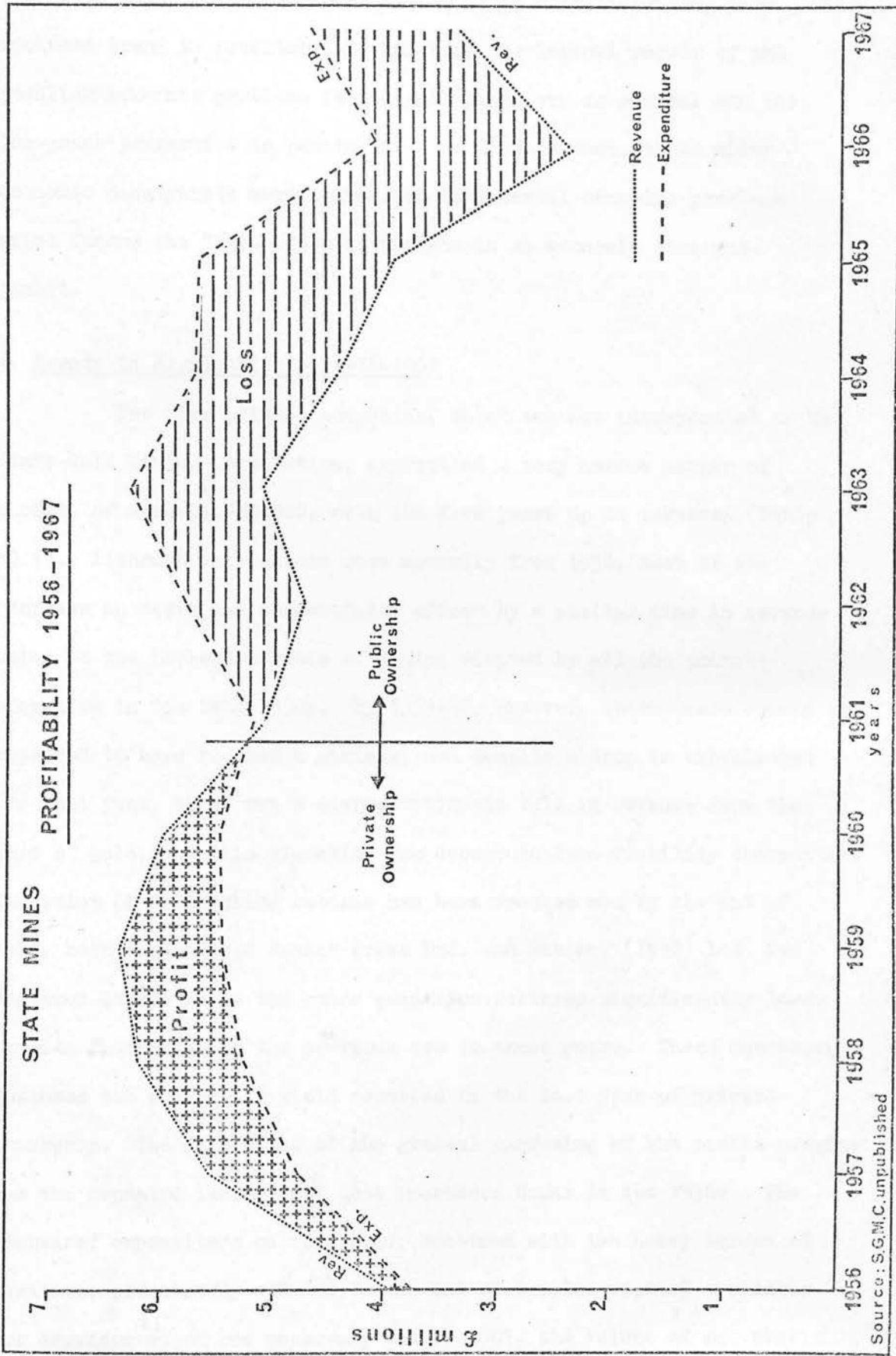
Under these circumstances, it is generally recognised that the supply of gold is unlikely to meet the ever-growing demand, and if output is to be maintained, financial aid in some form is imperative. With the price of gold at virtually the same level for over a quarter of a century, the ever-widening gap between unit costs and expected unit returns is inevitable, and this largely accounts for the introduction of formal aid schemes by the governments of the gold-producing countries. Ghana is, therefore, not alone in supporting the continued operation of gold mines which have become sub-economic under current cost conditions. One of the major problems of the world gold mining industry has been the plight of the low-grade properties, and a large number of these were forced to close under the inflationary economy which has obtained since the second world war. The governments of nearly every gold-producing

country give aid to their marginal mines where the gold industry is of particular importance, as in Ghana, in providing foreign exchange and/or in the support of old established mining communities. The only major exception is the United States of America and its government has persistently refused to grant direct assistance to its gold producers. Outside South Africa, some 40% of the primary gold production is subsidised, although the form and method of operation of subsidies differ from country to country. Outside Ghana, aid tends to be given through institutionalised payments to private producers, either as a depletion allowance or a direct reduction of taxation or as a direct subsidy normally expressed as X% per ounce. Of the large producers, Canada has operated a formal aid scheme for over twenty years during which some 250,000,000 dollars have been distributed to the gold mining industry. But even so, a steady decline in yield has been evident for some years and it is estimated that by 1975, assuming that the official price is unchanged, only nine or ten of the thirty-four mines currently active will have survived. Most of the smaller producing countries, however, have positively encouraged the industry to grow with government help. Colombia, the leading South American producer, initiated a scheme in 1967 to try to reverse the declining output; the Philippines production has grown almost ten-fold, from some 48,000 ounces in 1953 to 470,000 ounces in 1967 in direct response to government backing given to the industry. In Ghana, the principle differs in that the Government owns and operates the marginal mines itself as a State enterprise. In 1956 the Government had granted some small financial assistance to the marginal mines, but the aid came to an end in 1958. It was in that year, when financial conditions began to worsen for most of the privately-owned gold mines and many seemed unable to survive

without continued support, that the Ghana Government called in a Canadian expert to report on the possibility of introducing a permanent subsidy scheme with a view to enacting legislation similar to that existing in Canada. The report was not made public, and still remains classified material, but, whatever recommendations it contained, the Ghana Government took no positive action, along the lines of its terms of reference. It was not until 1961, when two of the marginal mines threatened to close, that government policy became clear. Long-term aid to private producers was rejected as an inappropriate measure, and instead, the Ghana Government chose the alternative of running the mines itself as a public corporation. It is, therefore, against this wider background that the economics of gold mining in Ghana should be understood.

THE COST OF SUBVENTION

It is suggested that the best means of determining the extent to which the gold mining industry in Ghana has required financial assistance from the Government to balance capital and operating accounts since 1961 is by describing and analysing the trends in profitability over the period 1956-1967. The ever-increasing cost of gold production relative to revenue is well illustrated by the fate of the State mines in Ghana. As can be seen on Fig.10.1, two distinct periods can be identified in respect of the profitability of the industry, and these periods correspond to the pre- and post-takeover years. The secular trend is, however, one-way; in essence, a decline in profitability has been characteristic of the industry since the mid-1950s, and this trend is rooted in the earlier immediate post-war years. The slim profit margins achieved by the private companies in the late 1950s were commuted into losses by their successor, the State Gold Mining Corporation, in the



Source: S.G.M.C. unpublished

1960s, as expenditure overtook revenue at an ever-increasing pace. This downward trend in profitability has been the logical result of the peculiar economic problems facing gold producers in general and the low-grade properties in particular. In Ghana's case, these wider economic constraints were aggravated by internal economic problems which forced the State mines to operate in an economic straight-jacket.

1. Trends in Profitability, 1956-1967

The five private companies, which are now incorporated as the State Gold Mining Corporation, aggregated a very narrow margin of profit, of some £3,000,000, over the five years up to takeover (Table 10.1). Although expenditure rose annually from 1956, much of the increase in costs was successfully offset by a similar rise in revenue owing to the increased scale of mining adopted by all the private companies in the late 1950s. By 1959-60, however, these scale economies appeared to have reached a maximum, and despite a drop in expenditure for that year, there was a disproportionate fall in revenue from the sale of gold, and this signalled the departure from viability thereafter. The point of diminishing returns had been reached and by the end of 1960, both Amalgamated Banket Areas Ltd. and Bibiani (1927) Ltd. had declared losses while the other companies declared significantly lower profits than those of the previous two to three years. These decreases followed the decline in yield recorded in the last year of private ownership. The main cause of the gradual narrowing of the profit margins was the repeated labour unit cost increases borne in the 1950s. The increased expenditure on this item, combined with the heavy burden of taxation, effectively reduced the amount of surplus capital available for development of ore reserves, and by 1961, the volume of ore available

TABLE 10.1

AGGREGATE PROFITS, STATE MINES : 1956-1960

	Tarkwa	Prestea	Bibiani	Dunkwa	Konongo	Aggregate
	£	£	£	£	£	£
1956	123,149L	69,388P	19,872L	118,834P	117,093P	162,294P
1957	58,497P	247,840P	76,165P	127,897P	172,200P	682,599P
1958	212,897P	206,035P	79,019P	198,193P	170,542P	866,686P
1959	170,867P	214,820P	68,731P	283,704P	131,410P	869,532P
1960	121,099L	313,197P	12,837L	209,787P	90,804P	479,852P
	198,013P	1,051,280P	191,206P	938,415P	682,049P	3,060,963P

P = Profit. L = Loss.

TABLE 10.2

AGGREGATE LOSSES, STATE MINES : 1961-1967

	Tarkwa	Prestea	Bibiani	Dunkwa	Konongo*	Aggregate
1961	419,539L	64,938P	33,071L	134,251P	-	253,421L
1962	841,150L	204,855L	191,445L	145,877P	-	1,091,573L
1963	904,909L	285,193L	254,476L	229,968P	-	1,214,610L
1964	872,641L	516,664L	176,471L	82,109P	-	1,483,669L
1965	1,046,031L	386,508L	329,423L	9,036L	-	1,770,998L
1966	930,787L	126,862L	435,144L	138,189L	77,887L	1,708,869L
1967	808,479L	58,593L	291,064L	59,513L	64,539L	1,282,188L
	5,825,536L	1,513,737L	1,711,094L	385,467P	142,426L	8,805,326L

* Konongo remained a private company until 1965.

Source for both tables: S.G.M.C.

in advance of immediate requirements was much less than the norm of four to five years' supply. The profit ratio of the gold mining companies as a whole was scarcely such as to encourage further investment from outside sources in this field, especially with the ever-present limiting factor of the rigid price of gold. Even if further scale increases could have been effected to avert the crisis of impending closures, it was doubtful if a continuation of this policy was in the best interests of the companies since it would have more than likely resulted in exhausting the ore reserves and wearing out the plant and machinery with little hope of making an adequate return on the invested capital.

And so, when the Government bought the marginal mines in 1961, their continued operation as economic enterprises was in doubt, and a small aggregate loss, of some £250,000, was sustained in the first year after takeover. Ever since, losses have mounted owing to the worsening of economic conditions which was foreshadowed in the last days of the private companies (Table 10.2). This sequence was inevitable in the absence of immediate measures to offset the upward march of operating costs. There were variations from mine to mine in the actual point in time at which operations ceased to be viable, but it is noteworthy that all the deep-level mines recorded their last profitable year immediately prior to takeover, and their peak profits in the penultimate year as private companies (Table 10.3). Only the dredging subsidiary of the State Gold Mining Corporation remained viable, as was expected, until 1964 since when losses have also been sustained.

A closer examination of the accounts of the mines of the State group reveals the relative burden of each subsidiary on the Government since takeover. In this context, the difference between revenue and expenditure can be expressed in two ways: as the working balance and as

TABLE 10.3

PROFITS : PEAK YEAR AND LAST YEAR

	Year of peak profit	Year of last profit
Tarkwa	1958	1959
Prestea	1960	1961
Bibiani	1958	1959
Dunkwa	1963	1964
Konongo*	1964	1965

* bought by State in 1965

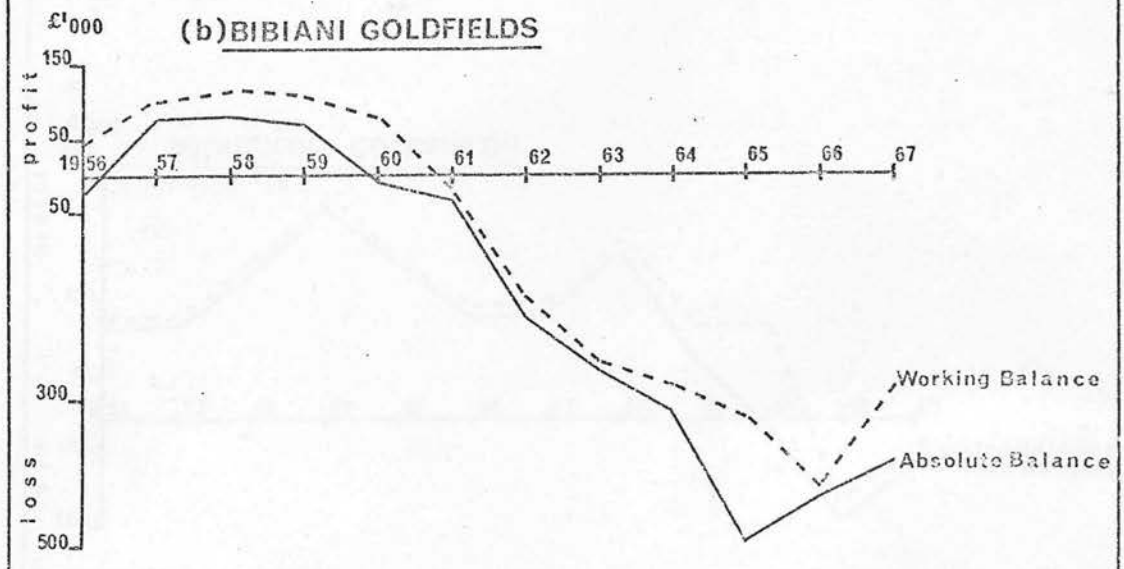
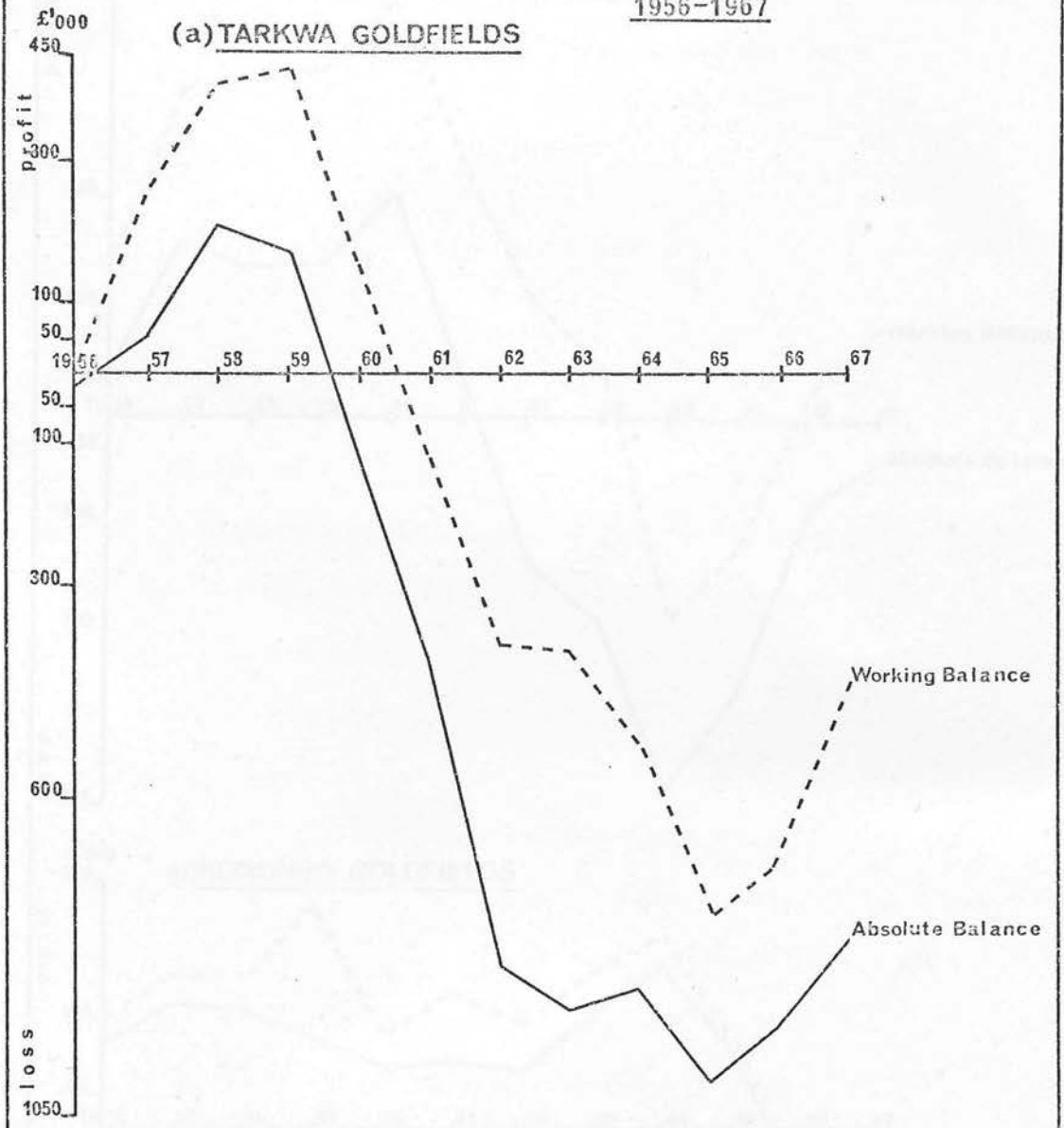
the final balance.¹ This basic distinction permits a more detailed analysis of the situation and a more meaningful pattern emerges of the transition from viable to sub-economic operations (Fig.102a, b, c, d and e). Therefore, the working balance will be greater or smaller than the final balance depending on whether a final profit or loss is declared. All the mines experienced a similar sequence in that a working profit often became a final loss after development and other items of expenditure had been added to working costs. Different orders of magnitude apply in each case, but the general trends in profitability are sufficiently similar to justify a general appraisal.

-
1. Working balance is defined as the difference between Total Revenue from the sale of gold, and incidental revenue, and Working Expenditure which comprises Mining, Milling, and General Charges. Final balance is defined as the difference between Total Revenue and Total Expenditure which comprises Working Expenditure PLUS Development, Special Development and Prospecting Costs.

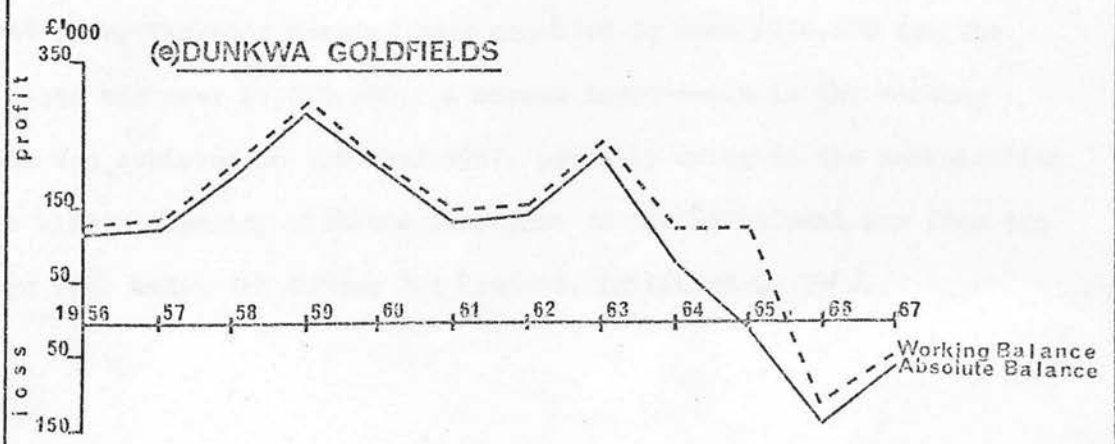
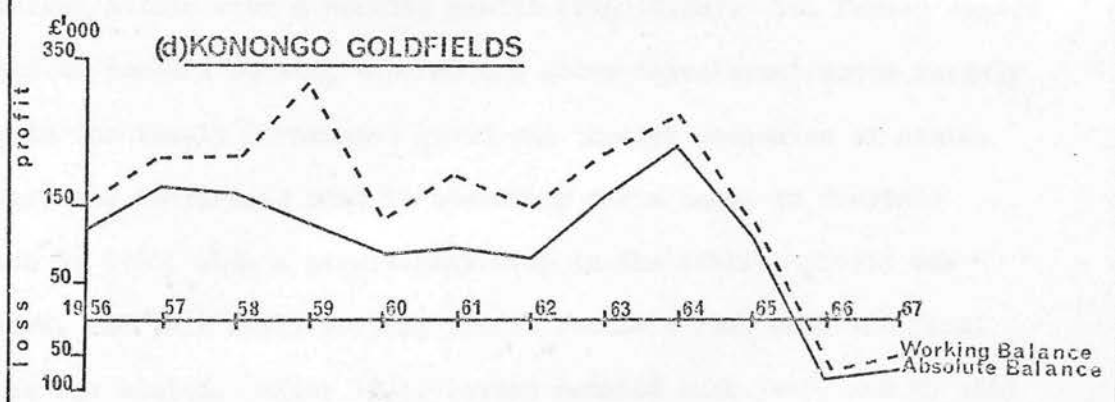
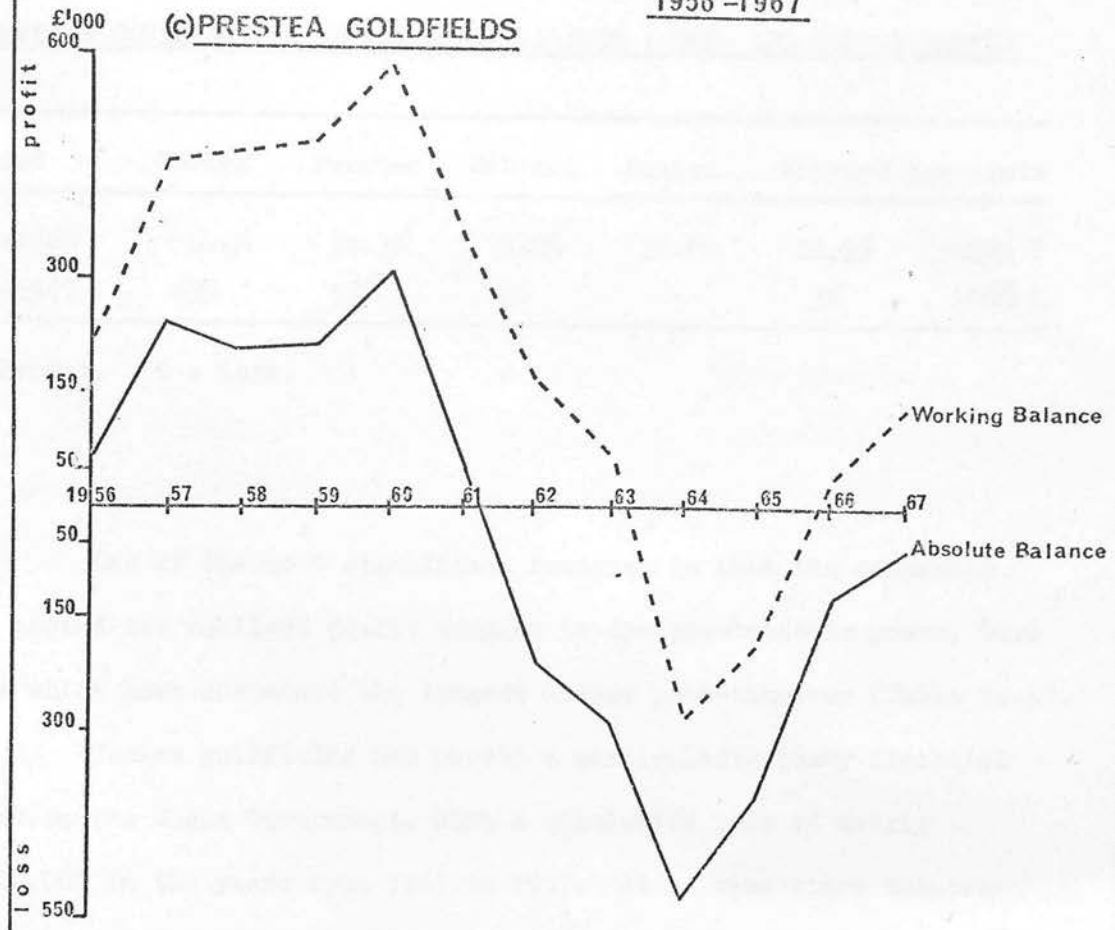
STATE MINES

PROFITABILITY

1956-1967



STATE MINES PROFITABILITY
1956-1967



Source: S.G.M.C. unpublished

FIG 10-2

215.
TABLE 10.4PERCENTAGE CONTRIBUTION TO AGGREGATE BALANCE : PRE- AND POST-TAKEOVER

Period	Tarkwa	Prestea	Bibiani	Dunkwa	Konongo	Aggregate
1956-1960	6.4%	34.3%	6.2%	30.6%	22.5%	100% P
1961-1967	63%	17%	18%	-	3%	100% L

P = Profit. L = Loss.

One of the most significant features is that the companies that showed the smallest profit margins in the pre-takeover years, were those which have sustained the largest losses post-takeover (Table 10.4).

Tarkwa goldfields has proved a particularly heavy financial burden on the Ghana Government, with a cumulative loss of nearly £5,500,000 in the years from 1961 to 1967. At no time since takeover did Tarkwa attain even a working profit (Fig.10.2a). The former owners managed to contain working expenditure above 'breakeven' costs largely owing to the timely Government grant and through economies of scale. However, the continuous rise in operating costs began to overtake revenue by 1960, when a significant drop in the working profit was recorded, and this small working profit became a loss when the final balance was stated. After 1961, losses mounted each year, and by 1965 Tarkwa goldfields had reached an acute state of financial depression; in that year, Tarkwa's working loss amounted to some £700,000 and the final loss was over £1,000,000. A marked improvement in the working balance was achieved in 1966 and 1967, probably owing to the maximisation of the mill's capacity with the treatment of the additional ore from the Konongo mine under the Custom Ore Project, initiated in 1966.

Bibiani goldfields had an equally disappointing record after takeover since when losses have been consistently recorded (Fig.10.2b). The losses accumulated to 1967 were of the order of £1,750,000. As at Tarkwa, Bibiani's profit margins were gradually squeezed in the late 1950s, and in the last year of private ownership, the small working profit was converted into a final loss. Thereafter, losses grew in scale till the low ebb encountered in 1966 when a peak loss of nearly £500,000 was sustained. Tarkwa and Bibiani goldfields have together accounted for some 80% of the aggregate claim of the State mines for government subvention.

By contrast, none of the other subsidiaries has sustained such dramatic losses relative to the scale of their operations. Prestea goldfields showed a working profit in all but two years, 1964 and 1965, although absolute losses were sustained from 1962 onwards (Fig.10.2c). Nevertheless, at its worst, Prestea's losses were contained within £500,000. The best average performance of all the State mines was achieved by Dunkwa goldfields, which continued to make profits until 1964 (Fig.10.2e). Indeed, a positive working balance was maintained until 1965, although in that year a final loss of some £9,000 was declared. On aggregate, the dredging subsidiary, in fact, made a profit over the six years from 1961 but its profits were not of sufficient magnitude to offset the losses incurred by its sister mines. Finally, Konongo goldfields has declared both working and absolute losses since it became part of the State Gold Mining Corporation in 1965 (Fig.10.2d), and the additional burden of yet another uneconomic unit merely aggravated the financial distress of the Corporation. Had the mine continued to operate as an integral unit after 1965, Konongo would have incurred even greater losses. Since 1961, the State mines required subvention of the order

of £9,000,000 to balance accounts (Fig.10.3). Before examining the reasons for the scale of these losses, a comment on the profitability of the private sector over the same period is appropriate.

Had the logic of pure economics been followed, Ghana's gold mining industry would consist of one mine, that of the Ashanti Gold-fields Corporation, at Obuasi. In common with the State mines, a narrowing of profit margins has been evident in recent years. However, the similarity ends there. One of the marvels of the old mining world, the Ashanti mine has defied all predictions of the inevitability of declining grade with depth, and ore reserves are approaching some 3,375,000 tons yielding one ounce of gold per ton of ore. However, the company needs such strength to carry the great burden of taxation and other charges imposed in Ghana and the United Kingdom. Its main economic problem has been the increasing level of taxation which has substantially reduced its profit margins in recent decades (Fig.10.4). For example, in the financial year 1967-68, taxation absorbed over 75% of the company's working profit. Nevertheless, in spite of repeated appeals for a reduction in taxation, there has never been any stage at which the company's balance gave cause for undue concern; it has paid dividends without interruption since 1900. Lonrho, the new owners, plan to achieve further economies of scale by expanding output to a level of 80,000 tons per month, and on its current performance the Ashanti mine has both the financial strength and the grade of ore to undertake this planned expansion without affecting its profitability.

2. Reasons for the Scale of Losses

The foregoing examination of the trends in profitability revealed the large scale of subvention required by the State Gold Mining Corporation, and it is suggested that the scale of these losses

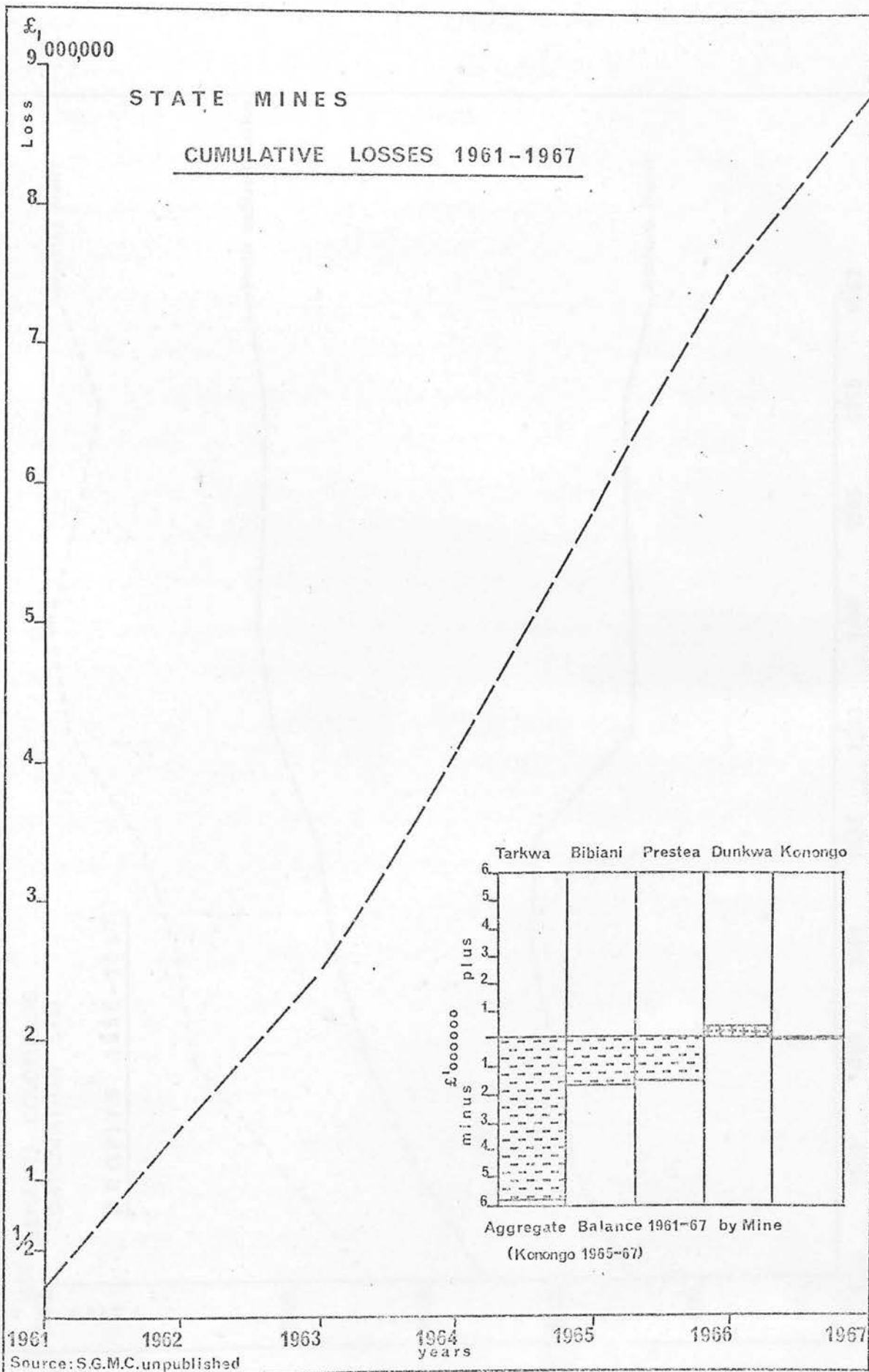


FIG 10-3

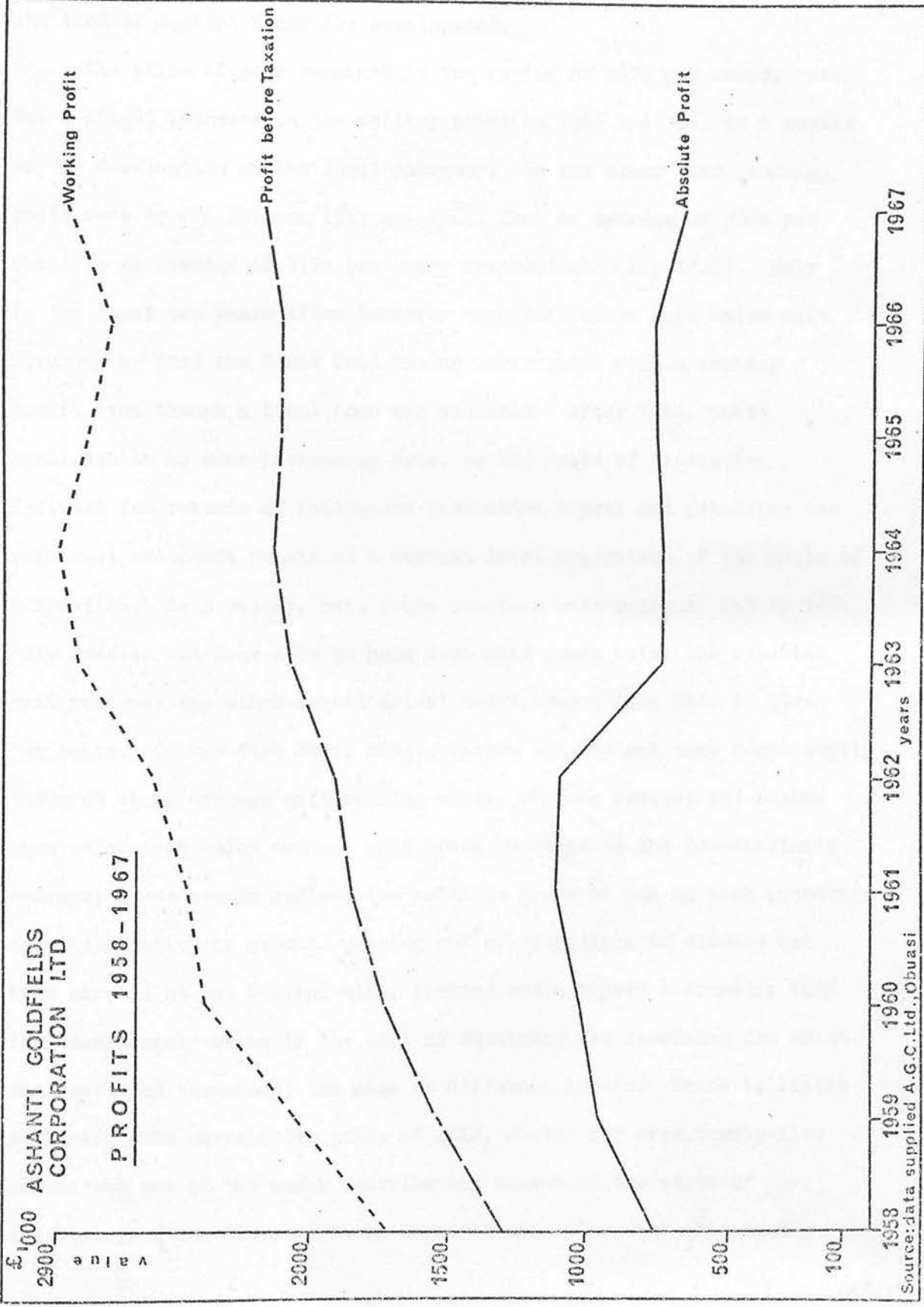
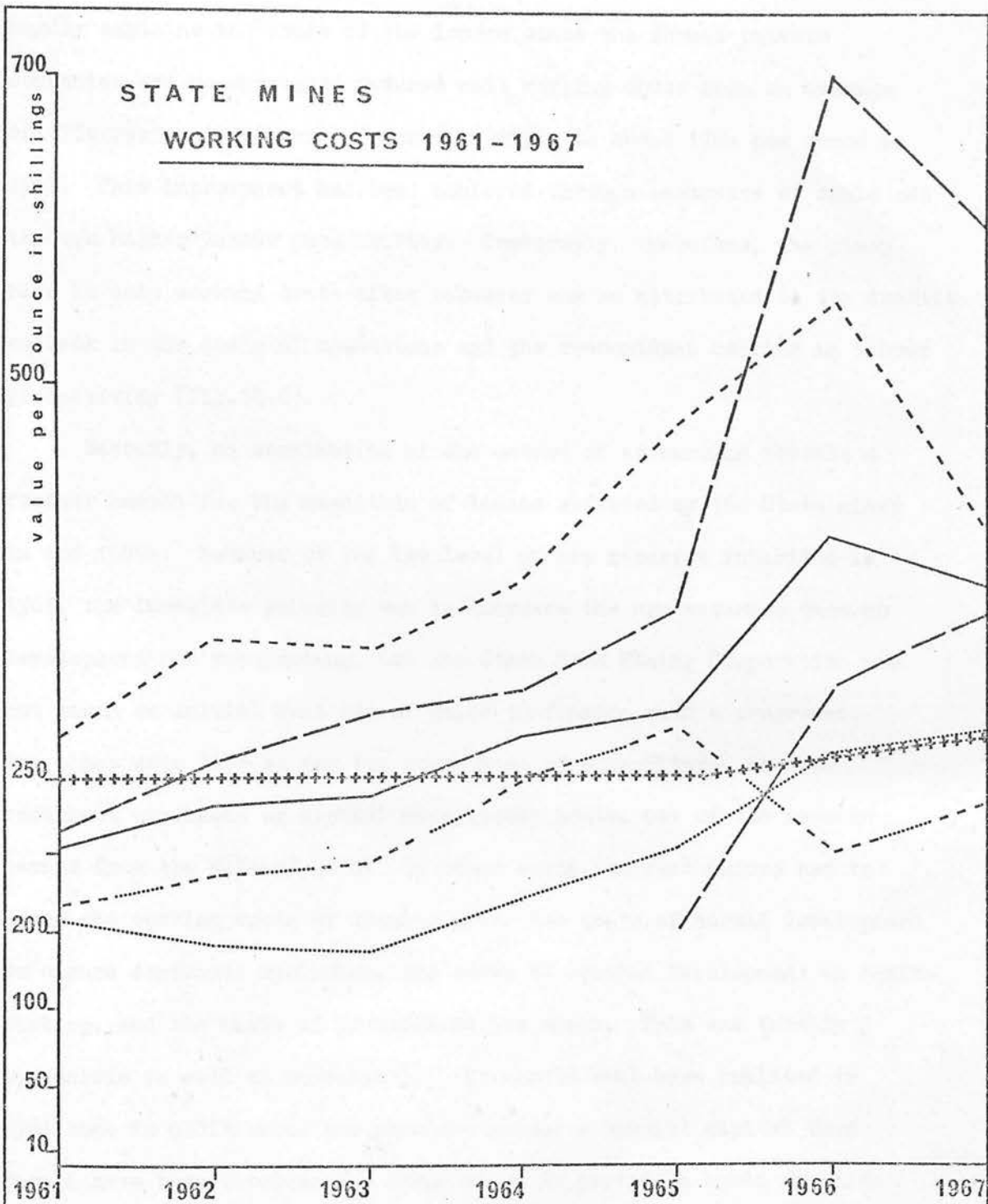


FIG 10.4

Source: data supplied A.G.C. Ltd., Obuasi

sustained between 1961 and 1967 can be attributed to two main factors, the inflation in working costs relative to the fixed price of gold, and the lack of capital funds for development.

The price of gold remained in the region of 250s per ounce, except for a slight increase in the selling price in 1966 and 1967 as a result of the devaluation of the local currency. On the other hand, working costs rose by 82% between 1961 and 1967, from an average of 204s per ounce to an average of 372s per ounce respectively (Fig.10.5). Only in the first two years after takeover were unit costs kept below unit returns, so that the State Gold Mining Corporation made a working profit even though a final loss was declared. After 1964, costs escalated at an ever-increasing rate, as the scale of production declined for reasons of inadequate production inputs and dwindling ore reserves; overheads remain at a certain level regardless of the scale of production. As a result, unit costs overtook unit returns, and by 1967 only Prestea had been able to hold down unit costs below the expected unit returns; the other subsidiaries' costs ranged from 284s to 594s per ounce. Of the five State mines, Tarkwa and Bibiani have consistently incurred above average unit working costs, whereas Prestea and Dunkwa have maintained below average unit costs relative to the Corporation's average; these trends reflect the relative grade of ore on each property. After the policy of gradual phasing out of operations to closure had been adopted at the Bibiani mine, working costs showed a dramatic 100% increase largely owing to the cost of obtaining the remaining ore which was scattered throughout the mine at different levels. There is little doubt that the unrealistic price of gold, static for over twenty-five years, was one of the major contributory causes of the state of insolvency of the State mines in Ghana in the 1960s, but this hardly



- Bibiani
- - - - - Tarkwa
- Prestea
- Dunkwa
- Konongo

————— S.G.M.C. cost/oz.
 + + + + + Revenue/oz.

Summary S.G.M.C.

	Profit per oz.	Loss per oz.
1961	4 6/-	
1962	1 9/-	
1963	1 2/-	
1964		1 5/-
1965		4 3/-
1966		14 6/-
1967		9 7/-

Source: S.G.M.C. unpublished

FIG 10-5

hardly explains the scale of the losses since the former private companies had on aggregate reduced unit working costs from an average of 175s per ounce of gold produced in 1956, to about 170s per ounce in 1960. This improvement had been achieved through economies of scale and through higher labour productivity. Conversely, therefore, the steep rise in unit working costs after takeover can be attributed to the drastic cutback in the scale of operations and the concomitant decline in labour productivity (Fig.10.6).

Secondly, an examination of the method of accounting reveals a further reason for the magnitude of losses suffered by the State mines in the 1960s. Because of the low level of ore reserves inherited in 1961, the immediate priority was to increase the ore reserves through development and prospecting, but the State Gold Mining Corporation was not given an initial fund out of which to finance such a programme. The mines were left to pay for every item of expenditure, whether recurrent overheads or special development costs, out of the revenue earned from the sale of gold. In other words, current income had to cover the working costs of winning gold, the costs of normal development to ensure continued operation, the costs of special development as shaft-sinking, and the costs of prospecting new areas. This was totally impossible as well as unrealistic. It should have been realised in 1961 that in addition to the purchase price, a special capital fund should have been voted to the Corporation to provide a basis on which a long-term development programme could be realised. It was not until 1966 that the Ghana Government recognised this fundamental need, and a Development Fund amounting to some £3,500,000 was awarded to the State mines. But, by this stage, expenditure had overtaken revenue at such a rate that much of the fund was used to balance current accounts.

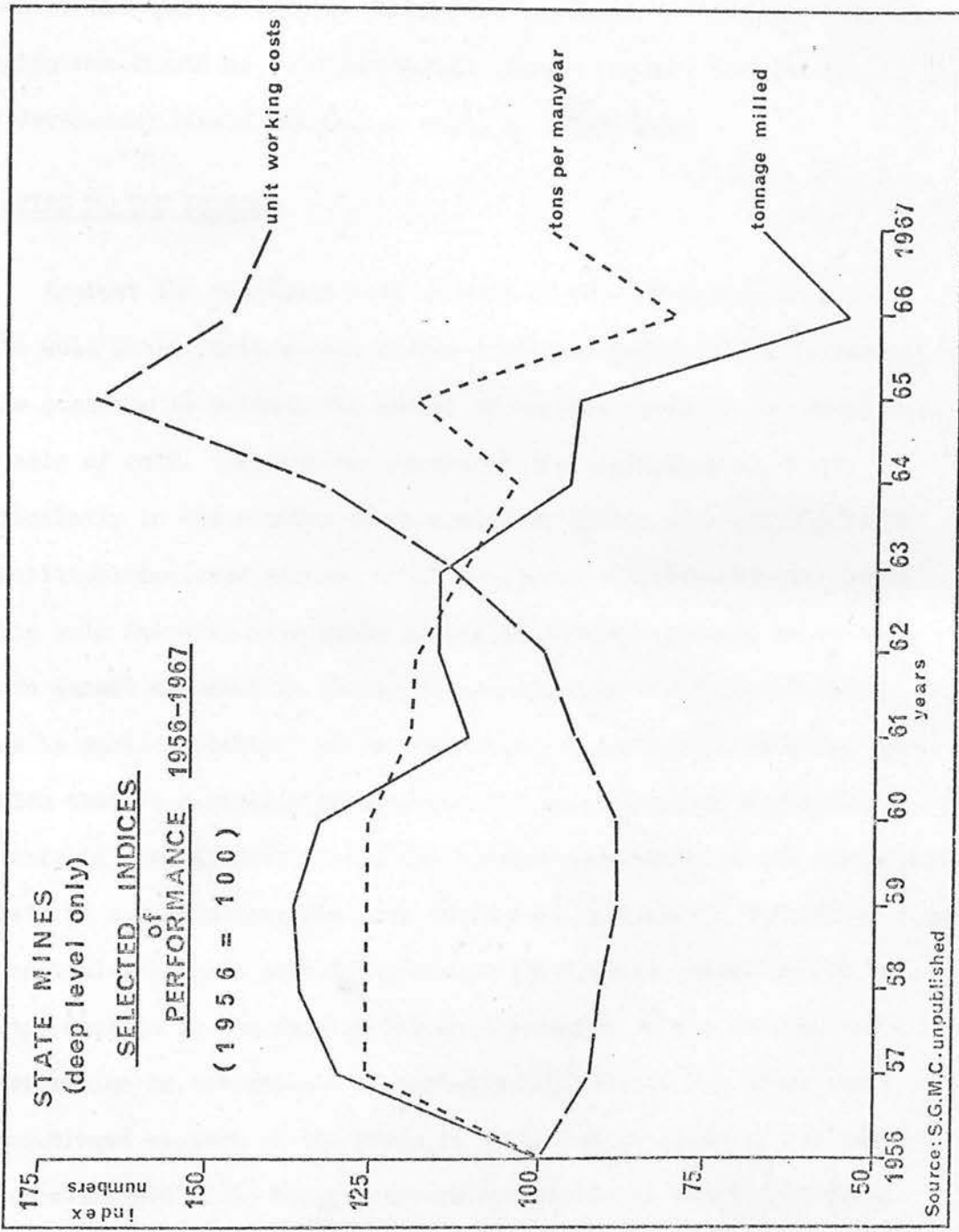


FIG 10-6

As a result, the scale of development required to redress the low level of ore reserves has not been achieved, production has been limited by this factor, and revenue in turn limited by the level of production, and all of these factors have affected the level of working costs. In essence, the lack of capital funds from the onset in 1961 had very wide-ranging ramifications, the end-result being a massive deficit which the Government itself has had to cover by subvention.

BENEFITS TO THE ECONOMY

Against the aggregate loss of some £9,000,000 incurred by the State Gold Mining Corporation in the first six years of its existence, it is possible to balance the amount of foreign exchange generated from the sale of gold. Despite the weight of the employment argument, particularly in the country where socialism is the main driving force in political decision-making, it is suggested that the economic value of the gold industry as a major source of foreign exchange is perhaps a more potent argument in favour of keeping open these unprofitable mines by public subsidy. It is essentially Ghana's high external debt problem that is currently restraining the development of the economy and this in turn is restraining the further generation of new employment outlets at a rate compatible with the annual increase in the labour force. The capital-intensive post-independence development programme led to a drastic decline in the foreign exchange reserves of the country and a deterioration in the balance of payments (Fig.10.7). In these terms, the continued support of the mines is justified in spite of the large losses sustained in so doing, especially when it is added that these losses are local currency losses.

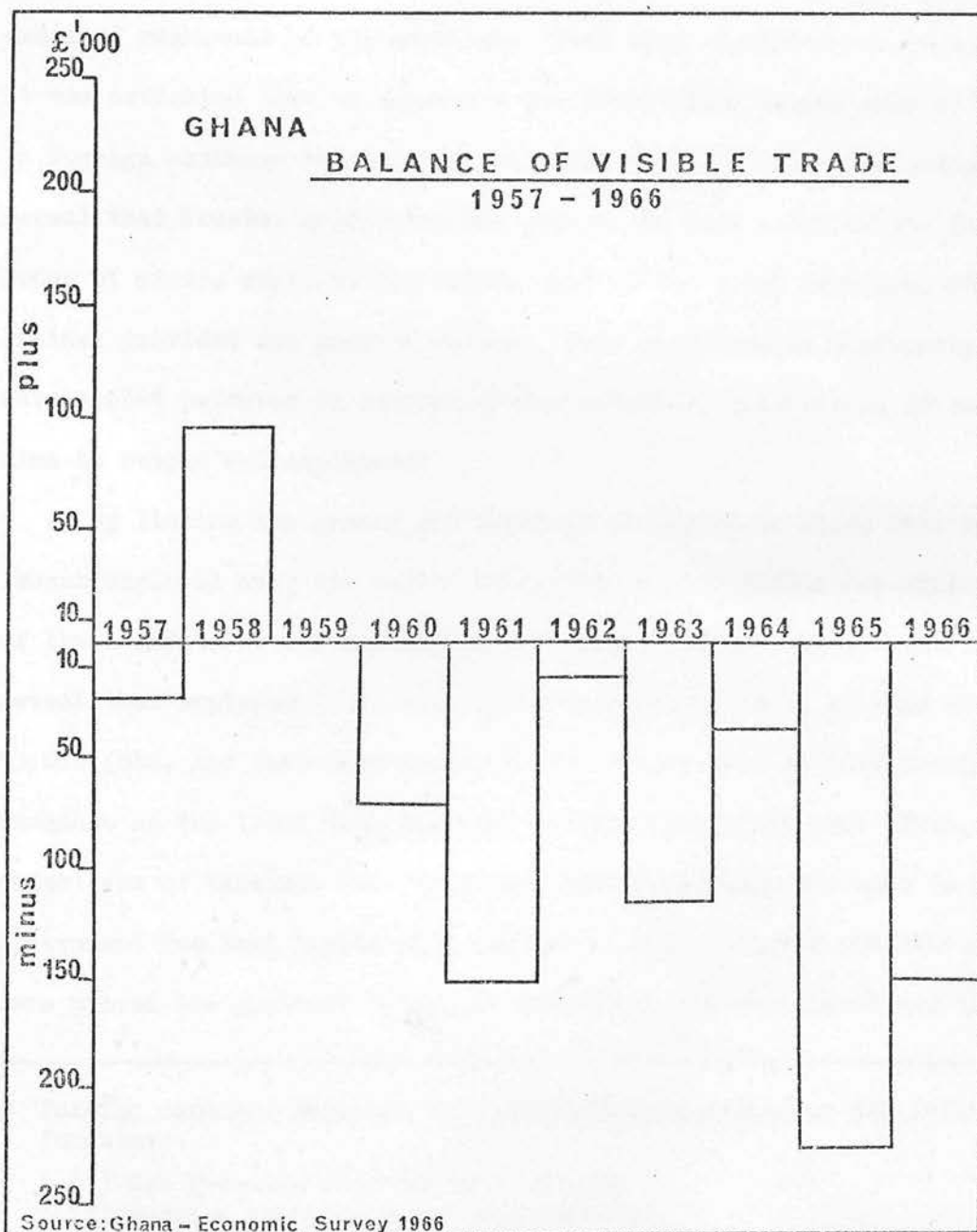


FIG 10·7

The actual foreign exchange earnings of the State Gold Mining Corporation are not directly available from official sources, but it has been possible to calculate the approximate foreign exchange value of the industry based on a formula used by T.Killick.² The figures must not be regarded as final and accurate: they merely indicate the order of magnitude of the earnings. With this qualification in mind, it was estimated that on aggregate the State mines earned some £20,000,000 in foreign exchange between 1961 and 1967 (Table 10.5). The estimates reveal that Prestea goldfields has proved the best asset of the State group of mines, contributing nearly half of the total earnings, while Bibiani provided the poorest return. This corroborates previously established patterns in respect of the relative contribution of each mine to output and employment.

By linking the losses and earnings of the State mines with the labour employed over the period 1961-1967, a more definitive statement of the benefits to the economy is made (Table 10.6). These statistics reveal that employment has been maintained at an annual average of some 13,000 jobs, and that each employee has earned twice as much foreign exchange as the local loss incurred in maintaining his job. Thus, the objectives of takeover have been realised even though the cost to the Government has been higher than was anticipated. Tarkwa and Bibiani have proved the greatest financial burdens on the Government and their

2. Foreign exchange earnings were calculated according to the following formula:

- (i) Net Proceeds from the sale of gold.
- (ii) Foreign exchange costs of production.
 - (includes: a. Depreciation
 - b. 10% of working costs
(the estimated import-content of output))
- (iii) Wage transfers abroad, taken at a per capita average of £2000

NET FOREIGN EXCHANGE EARNINGS = (i) minus ((ii) plus (iii))

TABLE 10.5

ESTIMATED FOREIGN EXCHANGES EARNINGS OF STATE MINES : 1961-1967

	Tarkwa	Prestea	Bibiani	Dunkwa	Konongo	Total State Mines
1961	1,115	1,466	579	433	-	3,593
1962	907	1,536	512	352	-	3,307
1963	1,065	1,416	447	604	-	3,532
1964	897	1,094	416	456	-	2,863
1965	462	1,251	485	485	-	2,683
1966	149	1,032	77	324	43	1,625
1967	763	1,364	92	394	161	2,774
	5,358	9,159	2,608	3,048	204	20,381

TABLE 10.6

COST AND BENEFIT PER MAN EMPLOYED ON STATE MINES : 1961-1967

	Labour employed	Loss per manyear (£)	Foreign exchange earned per manyear (£)
1961	14,197	17.8	251.6
1962	14,899	73.2	221.6
1963	15,671	77.5	225.3
1964	14,190	104.2	201.7
1965	12,383	134.3	232.8
1966	10,967	155.8	148.1
1967	11,804	108.6	235
Average 1961-67	13,444	£96	£216

Source for both tables: based on data supplied by S.G.M.C.

earning capacity remained below the Corporation average throughout the period while losses per manyear remained consistently above average (Fig.10.8a and b). But, in every case, the steep increase in the losses per manyear and the sympathetic downward movement of earnings per manyear were caused by the contraction of output linked to the policy of full employment to the detriment of labour productivity. The reduction in the labour force over the period was not commensurate with the reduction in output and this accounts for the dramatic rate of increase in losses per manyear sustained.

In addition to the foreign exchange earned by the Corporation and the employment which it supported, the industry contributed to the revenue of other sectors of the economy, albeit on a small scale. Linkages with other sectors of the economy are, in fact, weak, a characteristic typical of the whole economy. Being an export-oriented industry, gold mining has not stimulated 'offshoot' industries. Gold is exported to London for refining, and it undergoes no processing or transformation apart from the initial reduction and smelting into gold bars. But the industry does purchase local goods and services, and in this way there is some feedback into the economy by way of various payments: customs and harbour dues, rail freight charges, post, cable and telegraph charges, concession rents and payments to local chiefs, stores purchased locally etc. (Table 10.7).

A new link has recently developed since the mines transferred to the Volta grid; formerly the mines generated their own power in situ. The mining industry is currently one of the main industrial consumers of power in Ghana, and in 1967 the mines bought 165,000,000 kwh from the Volta grid, which represented 11% of the total power consumed from this source (excluding the aluminium smelter at Tema which is by far

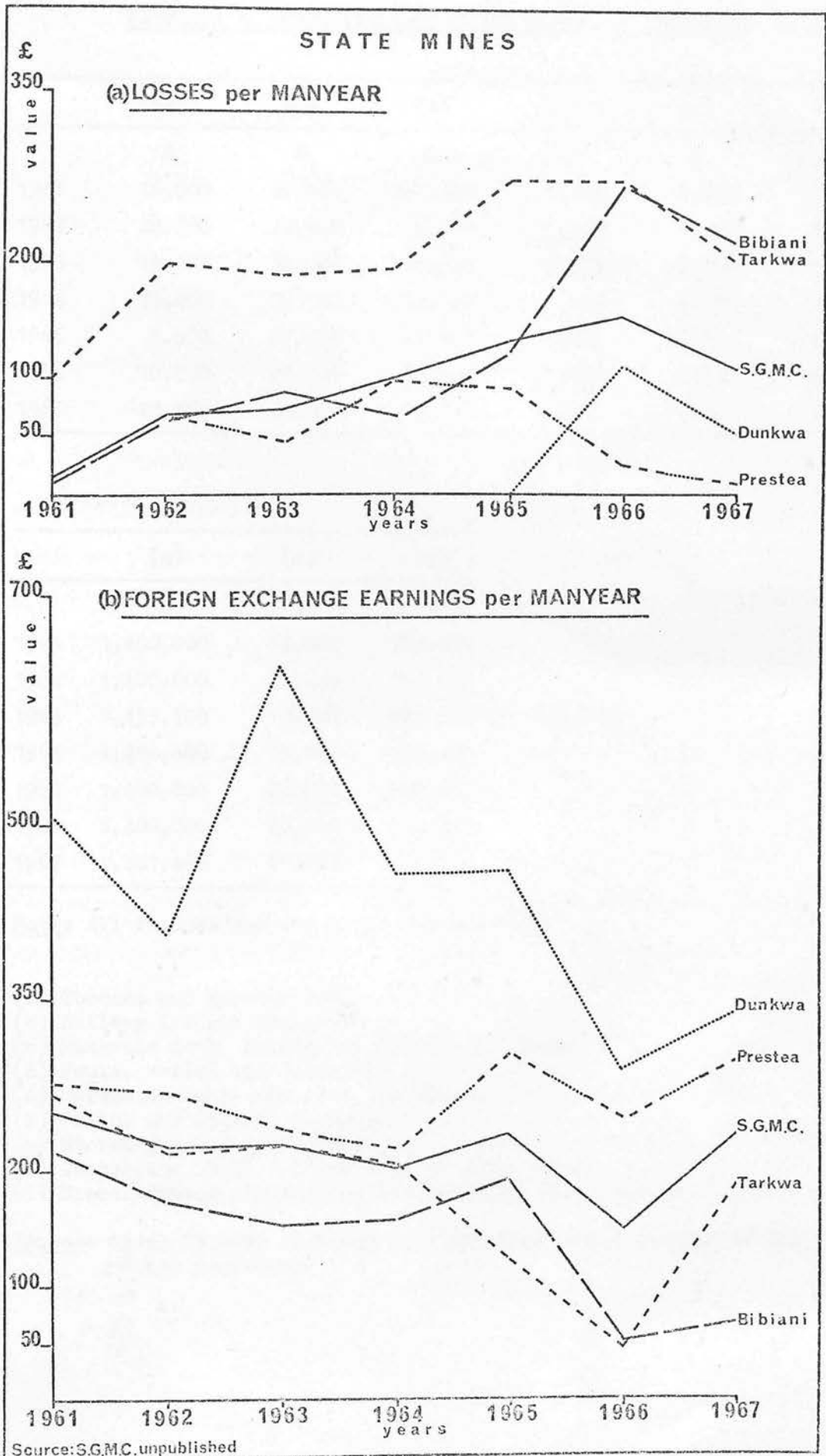


FIG 10·3

TABLE 10.7

PAYMENTS BY STATE MINES TO OTHER SECTORS : 1961-1967

	(a)	(b)	(c)	(d)	(e)	(f)
	£	£	£	£	£	£
1961	16,000	20,000	267,600	2,500	2,000	1,500
1962	48,200	22,600	53,700	2,300	2,400	1,500
1963	19,100	24,300	55,800	1,600	2,200	1,300
1964	15,400	21,500	130,300	1,600	2,600	1,100
1965	9,900	17,400	221,500	1,000	2,900	1,500
1966	10,800	21,300	303,800	1,300	2,600	1,600
1967	18,300	21,000	193,100	1,200	3,600	1,500

	(g)	(h)	(i)
	£	£	£
1961	1,400,000	18,800	160,000
1962	1,400,000	18,200	160,100
1963	1,497,100	17,000	215,500
1964	1,488,600	15,000	194,300
1965	1,400,000	22,000	169,600
1966	1,400,000	20,000	175,000
1967	1,407,400	17,000	180,000

Note: All figures rounded up to nearest £100.

- (a) Customs and harbour dues.
- (b) Railway freight charges.
- (c) Minerals duty, Income tax in U.K. and Ghana.
- (d) Posts, cables and telegrams.
- (e) Telephone rents and other charges.
- (f) Police and medical services.
- (g) Stores purchased locally.
- (h) Concession rents and payments to local chiefs.
- (i) Miscellaneous payments (Licences, Mines Dept. etc.).

Source: Ghana Chamber of Mines, Confidential Annual Returns of the member companies.

the largest consumer). However, it is expected that, unless new deposits are developed, the demand from the mining industry is unlikely to rise much above the current takeoff. This power link apart, the gold mining industry has forged few inter-sectoral linkages.

CONCLUSION

On balance, it would appear that the foreign exchange earning capacity of gold is the more important justification than the maintenance of employment in supporting the continued operation of the gold mines, since the availability of foreign exchange in the economy is the linchpin on which development depends. By 1967, the State mines contribution to Gross Domestic Product was under 1%, its share of the national labour force was under 2% while its contribution to export earnings was nearly 5%.

There are some aspects of man's economic activities which cannot be measured in purely economic and capitalistic terms, especially in a country striving for economic independence. While the economist might suggest that the Ghana Government would have been better to employ the £5,250,000 purchase capital in providing other sources of employment such as the establishment of import-substitution industries to save foreign exchange, the geographer is inevitably led to refute such an argument, based as it is on purely economic grounds. At any rate, it is highly unlikely that the capital employed in purchasing the gold mines would have otherwise been available, and hence its opportunity cost is zero. In addition, as was pointed out earlier, Ghana's support of her marginal gold mines is not unique, since in most gold producing countries the industry only survives by public subsidy, and in the smaller producing countries, as Ghana, the wider social and political considerations

override pure economic considerations, owing to the high internal and external value of gold to the economy. The geography of gold mining in Ghana today bears testimony to these considerations. Geography and politics are bound in a two-way relationship in influencing the form and structure of the economic landscape, as demonstrated by the survival of the gold mining industry in Ghana.

CONCLUSION

It is not intended to write a complete summary of the previous chapters, but rather to put into perspective the most significant aspects of the growth and development of the gold mining industry in Ghana as they affected the economic geography of the country.

It was not until the latter part of the nineteenth century that foreign capitalists were able to undertake direct mining on a permanent basis; previously European contact had been limited to trade in gold dust by barter. The era of commercial gold mining was pioneered by Pierre Bonnat in 1877 and other companies soon followed his example. The Colonial authorities welcomed this new field of enterprise for the economic development of the country, and it was openly recognised that, given encouragement, gold mining could attain a high internal and external value in the economy.

As soon as overseas prospectors moved in, land took on a value hitherto unknown; land rights in the Gold Coast, following the usual African pattern, were traditionally held by a group, and land was not originally a commodity to be traded. However, the local Chiefs were quick to realise the benefits that could accrue in offering valuable concessions to Europeans for a fee. In these terms, the development of modern mining represented the first serious impact of Western economic forces on traditional society. Wealth, far beyond the traditional limits, was now at the disposal of the native authorities as stool finances increased with the entry of European capital into the villages. It was not only the native authorities which profited from this new source of wealth, but others, as the African lawyers, whose services were in constant demand in respect of land transactions, also benefited.

The institutional and legal framework for the registration of companies did not exist in the Gold Coast, and so all the companies were registered abroad and financed by European shareholders. A few Africans tried to form companies, but they found it difficult to raise the necessary capital because the process of capital accumulation had barely begun, and technological and managerial expertise were largely absent.

The pioneer companies were handicapped by local problems in establishing the industry on a firm basis, and although the mines that were first developed were close to the coast, the difficulties of transport and climate were considerable, and the difficulty of obtaining a secure title to their concessions was an added constraint. Until the turn of the twentieth century, there was no alternative means of transport except the ill-kept bush tracks, or, in more favoured areas, rivers with dubious navigability. Access to the mining districts was possible via the Ancobra river, and thence by bush-track. Several amateur proposals for lines of railway were mooted, but no positive action was taken until the end of the nineteenth century. Although the Colonial Office received several deputations from West African merchants, bankers, business groups and the mining community from the early 1880s, all pressing for the construction of railways, it was not until 1898 that the Sekondi-Kumasi line was sanctioned, and this to serve the needs of the nascent mining industry above all.

The development of both mining and railways brought a considerable inflow of capital into the country, and this in turn stimulated exports of gold and other commodities, as cocoa, palm oil and timber, and encouraged imports. Indirectly too, the mining boom had an important influence on the establishment of ancillary services necessary for the economic development of the country. The first

systematic survey of the Gold Coast was made largely to avoid the constant litigation and confusion over concession boundaries; the first official team of surveyors began work in 1901, and by 1906 a map of the Colony had been produced. In addition, a Department of Mines was established in 1903, and in 1913, a Geological Survey Department was set up. The Geological Survey investigated the distribution of the gold-bearing ore deposits in the country and, incidental to this research, made significant discoveries of other economic minerals, the most important being diamonds, manganese and bauxite. Gradually, the Government extended other minor but important services with a more efficient network of communications. For example, the volume of mail engendered by the mining boom of 1897-1901 led to an increase in the number of post offices. But perhaps the most important single development facilitated by the new economic structure was the large-scale growth of the cocoa industry. The stations along the Sekondi-Kumasi railway quickly became marketing and collecting centres for cocoa.

Modern gold mining also had an important effect on the labour market. The ever-growing demand from the mines for workers soon brought the wage-earning system within the experience of even the most remote villages in the Northern Territories. Owing to the local deficit of labour in the mining districts, the mining companies were forced to tap more distant sources of supply, and in 1905, recruited a party of men from the North. This movement was initially welcomed and assisted by local government officials, and although the experiment was slow to gain momentum, the seasonal pattern of migration from the North was firmly established by the mid-1920s, and has remained an important characteristic of the labour market. The annual draining away of many able-bodied men from the Northern Territories, however, reduced the prospects of development there, and profoundly affected the character of village life.

After a brief post-war slump, the demand for labour increased, but the mines had considerable difficulty in tapping the north-south flow of migrant workers who were attracted into cocoa-farming and other employment outlets which had grown in number as economic development progressed. But, in 1924, an even more serious problem became apparent, when statistics revealed a very high death-rate among mine labourers. This resulted in the banning of recruiting in the North, and the establishment of Mining Health Areas, since it had been discovered that the high death-rate among the miners was due to the prevalence of hookworm and tuberculosis among the northern migrants, and to the unsatisfactory housing conditions, the polluted and insufficient water supply and the inadequate medical arrangements in most of the mining districts. Model villages were subsequently laid out, and the mining towns grew into sizeable settlements. Indeed, these centres have become among the largest settlements in their respective regions, and they have acquired an urban character offering a wide range of services, stimulated by the permanent market potential of the mining areas, derived from the geographical concentration of spending power at these points. Indeed, wage-earning labour represented a small minority of the total working population in the Gold Coast, and until the second world war at least, the mining labour force represented the most significant concentration of wage-earning employment on a large scale. But the mining communities were isolated, and since most of the value of the gold won left the country as repatriated salaries and dividends to the shareholders, the gold mines were economic enclaves, and stimulated few linkages with other sectors of the economy. In fact, the development of the gold mining industry typified the colonial pattern of development.

The real contribution which the gold mining industry made up to 1945 was limited to the export of gold which brought in revenue by way of the payment of export duty, taxes and royalties to the local treasury. In addition, the marked improvement in internal communications first stimulated by the needs of the mining industry, influenced the development and export of other primary products. Finally, its role in affecting the structure of the labour market and the distribution of population were profound and permanent. The regional alignment of the economy was firmly established in the late nineteenth and early twentieth centuries, with the development of the resources of the forest zone in the south and west. This remains the source of Ghana's principal primary products, and the importance of the gold mining industry in spearheading this development is apparent.

The growth and development of gold mining thus offers the key to contemporary patterns, and although the industry has contracted spatially since the second world war, largely owing to the upward pressure of operating costs relative to the rigid price of gold, its contemporary importance in the economy is nevertheless apparent. In Ghana, as in many of the gold-producing countries where the gold industry is singularly important in supporting employment in long-established mining communities and earning foreign exchange for the economy, the industry survives under government subsidy. It is a striking fact that the voice of the gold producer for an increase in the selling price of gold goes unheard in official circles despite the vital role which gold plays on the international economic scene. While economists debate the inadequacy of gold reserves to solve the problem of international liquidity, no serious thought is given to the economic plight of the producers. Indeed, the demand side of the equation dominates discussions,

while the suppliers are offered no solace except a tacit recognition of their inability to match supply with demand. It is hardly surprising that the world gold mining industry is unable to meet the demand for the metal in the light of current costs inflation, and the implications of these conditions are well-illustrated by the case-study. In Ghana, where unemployment is high and foreign exchange is in short supply, the Government cannot afford closures. The six-point distribution of gold mining centred on the towns of Tarkwa, Prestea, Bibiani, Dunkwa, Konongo and Obuasi is not an economic one, since only the Ashanti mine remains a profitable enterprise. The geography of gold mining in Ghana today is therefore artificial if measured in pure economic terms, but its survival in its present form demonstrates clearly the inter-relationship between politics and geography.

After cocoa and timber, gold is Ghana's third major export, but in spite of the continued prosperity of the Ashanti mine in the private sector, this is a declining asset. In the long-term, the Ghana Government will have to face the closure of the gold mines since they are based on wasting assets, and in the short-term, unless significant new discoveries of ore-bodies are made, or there is a substantial increase in the price of gold, the cost of maintaining the gold mining industry is bound to increase.

There is little likelihood that the pace of economic development in Ghana will in the near future attain a rate compatible with the annual increase in the labour force since the high external indebtedness of the Ghanaian economy precludes any such dramatic improvement. The analysis of the performance of the gold mining industry since Independence and the identification of the constraints on its output have shed some light on the wider problem of economic development in the developing

world in general. It was shown that production of the gold mining industry not only stagnated but declined because of inherited and externally-induced problems, creating for the State mines a vicious circle of poverty. In these terms, this study is more than a case-study in mineral geography in that it reflects, in microcosm, the wider social and economic problems of the developing world.



[The following text is extremely faint and largely illegible. It appears to be a list of items or a detailed description of a study, possibly related to the gold mining industry mentioned in the main text. It includes several lines of text that are difficult to decipher due to low contrast and blurring.]

APPENDIX IGLOSSARY OF MINING TERMS IN USE IN GHANA

- Adit: A horizontal or slightly inclined tunnel entering a mine from the surface.
- Alluvial Deposit: Deposits of water borne sediment, sand, gravels, etc., containing minerals of value, e.g., alluvial gold, alluvial diamonds.
- Amalgam: A metal united with mercury, e.g., Gold Amalgam.
- Amalgamation: The process of extracting gold and silver from crushed ores using mercury.
- Anticline: The arch formed by folded ground.
- Assay: The determination of the quantity of pure metal in an ore or alloy.
- Banket: A gold-bearing conglomerate of alluvial origin found underground.
- Bed-rock: The rock underlying alluvial deposits.
- Blocking out: Working in blocks; also proving an ore body on at least three sides.
- Boxhole: An ore pass or passageway connecting a stope to the level below.
- Breccia: A rock composed of angular fragments bonded together.
- Bullion: Gold or Silver in bars.
- Cage: Elevator in a mine shaft used to transport personnel, materials or ore in trucks.
- Carat: (a) A weight used in weighing precious stones; 142 carats approximately equals 1 oz.
(b) A term used to denote purity of gold jewellery; 24 carats being taken as pure gold.
- Caving: (a) A method to assist support, in which the hanging-wall is broken or allowed to break at a determined distance from the working face.
(b) A method of extraction by inducing controlled collapse of ore in a stope.
- Cementation process: A method of sealing off water occurring in shafts and tunnels by injecting cement under pressure via boreholes into the wall rock.

- Chute: An ore pass.
- Shoot: Pay shoot refers to the payable portion of a reef or vein.
- Concentrate: The extract from ore or alluvial gravels after partial treatment and immediate to final separation of the mineral or diamonds.
- Conglomerate: Rock formed by round stones bonded together.
- Corduroids: Corduroy type blankets used to remove free gold from wet and finely crushed ore.
- Core: The sample obtained by boring with hollow drill.
- Country rock: The rock in which the lode is found.
- Cross-cut: A tunnel driven at a considerable angle to the strike of a reef or to a main drive.
- Dead Work: Preparatory or development work which is in itself unpayable.
- Development: Work done preparatory to production and to establish payable ore available.
- Dilution: The percentage of waste ground unavoidably extracted with payable ore.
- Dip; The inclination of a reef to the horizontal taken normal to the strike.
- Dredging: Excavation underwater; mechanical excavation of sands, mud, silts forming the bed of a river lake, etc.: either to maintain the depth of the waterway or to extract from the dredged material minerals of value.
- Drive: A graded tunnel. When driven parallel to the reef in the footwall it is termed a footwall drive; in the reef, a reef drive, and in the hanging wall a hanging wall drive (Ashanti Goldfields Corporation Limited term a drive parallel to the reef, a sidetie).
- Dwt: "Pennyweight" equal to one-twentieth of a troy ounce.
- Dyke: A later intrusion, similar to a lode intrusion but of no mineral value, cutting across reef and country rock.
- Eluvial: Rock broken down by natural forces but left in situ.
- Exposure: The horizontal length of reef indicated by development on any one level.
- Face: The rock face at the end of a drive or excavation.

- Fault: A dislocation and displacement along a shear-plane in reef and country rock. The displacement is termed the "throw" and the direction of displacement names the fault, e.g., Up-throw.
- Filling: Waste rock or tailings used to fill mining excavations often permitting the removal of other supports particularly if these are of value.
- Fissure: A crack in the earth's crust.
- Footwall: The wall on the lower side of a reef, with regard to the general dip.
- Grade: The ratio by weight or in the case of alluvial deposits by weight to volume of the mineral to the ore or associated material.
- Hanging Wall: The wall on the upper side of a reef, with regard to the general dip.
- Hydraulicking: Breaking down surface deposits with a high velocity discharge of water.
- Inch-dwt.: The multiple of the width of reef in inches and the grade in pennyweights used as a basis for comparison.
- Incline: An inclined tunnel or shaft.
- Intake: The entrance to a mine or mine working taken by ventilating air: "Return" is used to indicate the exit path.
- Leaching: Separation of metals from their salts by treatment with a solvent.
- Lenticular: Shaped like a double convex lens, the shape often taken by separated small bodies of ore.
- Levels: Access tunnels to mine workings from the shaft, generally cut at regular intervals in depth and numbered according to their distance from the surface or datum level.
- Lode: A mineral deposit occurring between the walls of a fissure or crack in the earth's crust, often caused by the mineral intrusion, each separate intrusion is called a "vein". The term "reef" is in common use in Ghana as an alternative to lode and, given a distinctive name, e.g., Main Reef, Cote d'Ore Reef, is used to differentiate veins.
- Mine Shaft: Entrance to a mine; rectangular or circular; usually vertical, occasionally inclined in which case it is termed an "inclined Shaft". An "Internal Shaft" is one which does not open to the surface.
- Nugget: A lump of gold found in situ.

- Open-Cast or Open-Cut: An excavation worked from and open to the surface.
- Ore: Rock containing a mineral which can be worked with economic advantage.
- Ore Pass: Passageway (cut in rock) for gravitational transit of ore.
- Ore Reserve: The quantity of payable ore that can be extracted as indicated by development. The reserves are further classified as "proved", "probable" or "possible" depending on the degree of development and nature of the ore body.
- Outcrop: That part of a lode exposed on the surface.
- Overburden: Topsoil, clays, etc., covering a deposit to be worked.
- Panning: A field method used to separate out gold or diamonds from alluvial gravels or crushed ore by "washing" with water in a pan or bowl by hand.
- Paddock: A rectangular excavation, a method used in working an alluvial deposit.
- Pay Streak: A rich strip in a mineral vein, in a gold ore, seen as visible gold.
- Picking: Picking by hand from a moving belt obvious pieces of ore or waste rock as required. Picking the "eyes" out of a mine refers to the practice of extracting an undue proportion of the richest ore, thus lowering the average grade of the remaining ore reserves.
- Pillar: Part of the vein left in situ as a support, often necessary in the vicinity of shafts and in workings under important surface sites to avoid subsidence.
- Pitch: The dip of the pay chute on the line of strike.
- Pitting: Sampling alluvial deposits by means of small pits.
- Placer: An alluvial gold deposit.
- Pocket: A body of rich ore in a vein of small extent.
- Prospect: To search for minerals, oil, etc.
- Pulp: Wet pulverised ore from the mill.
- Reduction: A process of separating metals from their ores.
- Replacement Deposit: Deposit resulting from intrusion of reef material into the country rock and chemical alteration of the associated constituents to form a mineral deposit. Impregnation deposits are the result of a similar intrusion without chemical interaction taking place. A widespread intrusion gives a "massive deposit" with ill defined and irregular walls, limited intrusion creates a "contact deposit".

- Rise (Raise) or Winze: A vertical or inclined passageway cut in rock to connect two levels in a mine. A rise is driven upwards and a winze downwards.
- Setts: A type of support in mine workings.
- Skip: An elevator in a mine shaft, used for the transport of ore, designed to carry a greater load per size than a cage and permitting direct loading from a chute and automatic unloading.
- Stopes: The main producing workings in a metaliferous mine. Stopping methods have a general classification, either "underhand" or "overhand", depending whether they are worked below or above the starting level and each method is referred to by a particular name, e.g., Rill Stopping, Flat-back, Shrinkage, etc.
- Stope Drive: A drive in reef to begin a stope.
- Strike: The direction of a horizontal line following the reef channel.
- Stringers: Small veins; when occurring in a group are referred to as "Stockwork" and if of sufficiently high grade must be mined with associated rock.
- Sub-level: An intermediate level driven from a rise or winze.
- Subsidence: Collapse of ground at the surface due to mining excavations underground.
- Syncline: The trough formed by folded beds.
- Tailings: Waste from crushed ore or alluvial sediment after treatment.
- Tributers: Miners who work on their own account and are paid for the ore or diamonds they obtain by the mine owner, differing from contract or piece workers who work as required by the mine owner.
- Underlie: Complementary angle to the angle of dip: the rock enclosed by this angle.
- Upcast: The shaft up which the ventilating air current passes out of a mine. "Downcast" refers to the shaft down which air enters the mine.
- Water Level: The level at which natural drainage ceases.
- Width: True Width of a reef at any point is the width measured normal to the dip at that point. Apparent Width is the width at any other angle.
- Workings The openings in a mine such as adits, shafts, levels, drives, stopes, etc.

APPENDIX II

YEARLY OUTPUT OF GOLD FROM 1880

Year Jan.-Dec.	Ounces Fine Gold	Estimated Value	Year Apr.-Mar.	Ounces Fine Gold	Estimated Value
1880-1883	45,220	£192,094	1923-1924	200,703	£852,548
1884	15,581	66,189	1924-1925	210,301	893,359
1885	21,182	89,981	1925-1926	198,083	841,394
1886	17,615	74,829	1926-1927	189,117	803,369
1887	19,107	81,168	1927-1928	168,933	717,833
1888	20,365	86,510	1928-1929	167,115	709,903
1889	24,294	103,200	1929-1930	218,494	928,161
1890	21,576	91,657	1930-1931	246,075	1,045,327
1891	20,742	88,112	1931-1932	264,422	1,344,427
1892	23,259	98,806	1932-1933	284,841	1,696,342
1893	18,620	79,099	1933-1934	308,960	1,979,229
1894	18,078	76,796	1934-1935	337,065	2,358,680
1895	21,539	91,497	1935-1936	367,819	2,600,738
1896	20,289	86,186	1936-1937	461,621	3,244,503
1897	19,962	84,797	1937-1938	590,026	4,135,433
1898	15,028	63,838	1938-1939	701,417	5,075,524
1899	12,076	51,300	1939-1940	818,911	6,550,469
1900	8,947	38,007	1840-1941	882,241	7,410,824
1901	5,223	22,187	1941-1942	880,000	7,392,000
1902	22,806	96,880	1942-1943	721,315	6,059,046
1903	59,979	254,790	1943-1944	536,727	4,508,507
1904	89,096	378,481	1944-1945	527,628	4,432,075
1905	153,913	653,821	1945-1946	540,906	4,639,351
1906	210,049	892,291	1946-1947	604,250	5,204,103
1907	273,898	1,163,517	1947-1948	557,185	4,798,756
1908	281,257	1,194,743	1948-1949	682,014	5,873,846
1909	230,494	979,074	1949-1950	679,173	7,354,764
1910	183,691	780,398	1950-1951	694,886	8,625,272
1911	253,977	1,079,024	1951-1952	679,831	8,438,402
1912	352,957	1,499,469	1952-1953	700,139	8,690,475
1913	388,126	1,648,770	1953-1954	734,630	9,118,595
1914	410,655	1,744,499	1954-1955	787,922	9,780,081
1915	404,781	1,719,638	1955-1956	562,445	6,981,349
1916	383,651	1,629,746	1956-1957	767,204	9,522,920
1917	364,707	1,549,275	1957-1958	797,493	9,898,881
1918	314,862	1,337,537	1958-1959	842,113	10,452,728
1919	295,226	1,254,258	1959-1960	915,317	11,361,372
1920	207,506	881,484	1960-1961	878,459	10,903,872
1921	203,395	863,979	1961-1962	823,115	10,216,914
Jan-Mar '22	55,665	236,425	1962-1963	911,663	11,316,017
Apr-Mar			1963-1964	912,592	11,327,547
1922-1923	204,073	866,902	1964-1965	851,090	10,564,155
			1965-1966	708,906	8,799,295
			Total	30,626,614	£273,719,630

Source: Ghana Chamber of Mines, 39th Annual Report, 1965-66.

APPENDIX III

LABOUR EMPLOYED IN GOLD MINING : 1904-1966

	Europeans			Africans		
	S.	U.	Total	S.	U.	Total
1904	n.a.	n.a.	611	n.a.	n.a.	17,044
1905	338	166	504	8,928	3,537	12,465
1906	221	335	556	4,764	8,816	14,580
1907	n.a.	n.a.	560	n.a.	n.a.	14,677
1908	325	264	589	8,705	6,500	15,205
1909	329	171	500	9,798	5,597	15,395
1910	434	238	672	11,626	6,840	18,466
1911	513	257	770	10,902	7,391	18,293
1912	478	234	712	9,467	7,454	16,921
1913	360	204	564	7,970	7,124	15,094
1914	329	208	537	7,371	7,833	15,204
1915	291	184	475	7,217	7,607	14,824
1916	267	180	447	7,556	6,987	14,543
1917	258	150	408	7,790	7,212	15,002
1918	217	113	330	6,483	6,344	12,827
1919	192	95	287	5,698	5,307	11,005
1920	190	75	265	5,822	3,953	9,775
1921	186	66	252	6,479	3,834	10,313
1922	195	78	273	6,897	5,243	12,140
1922-1923	190	75	265	5,866	4,217	10,083
1923-1924	178	79	257	5,929	4,096	10,025
1924-1925	156	73	229	6,108	4,230	10,338
1925-1926	135	55	190	5,116	4,019	9,135
1926-1927	128	67	195	4,201	4,039	8,240
1927-1928	124	78	202	4,034	3,797	7,831
1928-1929	132	77	209	4,258	3,534	7,792
1929-1930	132	68	200	4,106	3,280	7,386
1930-1931	116	66	182	3,767	3,398	7,165
1931-1932	107	64	171	3,978	4,026	8,004
1932-1933	120	79	199	4,787	4,095	8,882
1933-1934	153	102	255	5,839	4,613	10,452
1934-1935	227	162	389	8,485	6,678	15,163
1935-1936	364	257	621	14,502	9,033	23,535
1936-1937	471	284	755	16,470	10,621	27,091
1937-1938	482	301	783	15,552	11,761	27,313
1938-1939	557	315	872	18,463	12,071	30,534
1939-1940	597	325	922	20,891	12,833	33,724
1940-1941	537	226	763	20,752	14,522	35,274
1941-1942	484	203	687	19,849	15,103	34,952
1942-1943	427	158	585	18,385	14,035	32,420
1943-1944	334	126	460	13,953	8,991	22,944
1944-1945	301	115	416	14,267	10,322	24,589
1945-1946	286	135	421	15,835	10,923	26,758
1946-1947	455	182	637	19,742	11,869	31,611
1947-1948	497	254	751	18,985	13,263	32,249

APPENDIX III (contd.)

	Europeans			Africans		
	S.	U.	Total	S.	U.	Total
1948-1949	515	209	724	15,848	13,392	29,240
1949-1950	508	235	743	15,800	13,120	28,920
1950-1951	506	261	767	16,521	13,254	29,775
1951-1952	525	268	793	16,155	12,775	28,930
1952-1953	511	263	774	15,138	11,962	27,100
1953-1954	530	257	787	14,949	12,950	27,899
1954-1955	537	269	806	12,857	12,507	25,364
1955-1956	504	276	780	10,599	11,197	21,796
1956-1957	468	246	714	9,962	11,111	21,073
1957-1958	438	254	692	9,751	11,826	21,577
1958-1959	457	269	726	10,304	12,250	22,554
1959-1960	459	259	718	9,155	12,962	22,117
1960-1961	354	226	580	8,267	11,352	19,619
1961-1962	304	229	533	8,954	12,165	21,119
1962-1963	289	232	521	9,121	12,279	21,400
1963-1964	211	204	415	8,463	10,211	18,674
1964-1965	185	159	344	8,558	9,838	18,396
1965-1966	170	128	298	8,409	9,547	17,956

S = Surface. U = Underground.

n.a. = not available.

Sources: A.R.M.D., 1904-1915 inclusive; Chamber of Mines, A.R., 1955 and 1966.

APPENDIX IVCOMPETING CLAIMS TO TITLE OF LAND IN THE GOLD COAST :

Memorandum from the Gold Coast Exploration and Trading Co. Ltd. Enclosure in letter, dated 17th September 1903, to Colonial Office. (CO96/414)

34, Clements Lane,
Lombard Street, E.C.
7th September, 1903.

MEMORANDUM

The properties originally purchased by this Company were known as Baidoo, Ageewah, Impatassie and Subirihu, and their leases were dated respectively as follows, viz:-

Baidoo	dated 20/7/97	area	4 miles by 8 miles
Ageewah	" 15/6/96	"	8 miles by 8 miles
Impatassie	" 14/1/96	"	about 12 miles square.

The above three properties were leased to the Company by Chief Yireh and signed by the paramount chief Agieman of Dixcove. The Subirihu Mine lease, dated 2/3/99, is a small property to the south of the above mentioned properties, and was leased by Chief Agieman of Dixcove.

All the necessary legal documents vesting the property in the Company have been duly registered on the Gold Coast, and so far everything has been properly and legally done, and the Company has been in possession and actively working the Baidoo and Impatassie properties since 1896, and have paid a yearly rental of £125 per annum.

It was not until the July of 1901 that this Company heard of any opposition or claim against the Company's title, and this was through the Scottish Wassau Syndicate, who held deeds dated as follows:

October, 1900	(Ehyirebaka concession)
15/4/01,	(Tua Concession)
30/4/01,	(Okkubeybaka concession).

These properties were leased to them by Chief Ghante and purported to cover practically the whole of the area of our properties previously mentioned, namely, Baidoo, Ageewah and Impatassie.

In November, 1901, arrangements were made whereby the Scottish Wassau Syndicate joined this Company, and we thus acquired their interest in the leases above mentioned.

In the following year, (1902) we again had notification of further opposition to our properties through the Bansu Properties Limited of Liverpool, who were applying for certificates of validity to properties known as

Ekkubeybaka,	lease	dated	12/1/01
Kukubeybaka	"	"	16/1/01
Yeransoo	"	"	20/10/00

and it was assumed that these properties also overlapped our original Baidoo and Impatassie properties, and the lessee to the Bansu Properties Ltd. was the same Chief as the one to the Scottish Wassau Syndicate, namely Chief Qwesi Ghante.

It would appear from the above that Chief Qwesi Ghante has in these two instances granted duplicate leases for the same property.

After considerable trouble arrangements were made with the Bansu Properties Ltd. whereby they amalgamated with this company and vested the interests in their leases in this Company for a valuable consideration.

In the meantime the case came before the Court and our original Baidoo and Impatassie leases were declared by Justice Morgan to be invalid on the ground that although obtained from Chief Yireh, the rightful soil chief, they were confirmed by Chief Agieman, who, it was proved in Court, had no right to confirm, and the Court upheld Chief Ghante's claim as Paramount Chief to this District. The result was that we entirely lost our property under the original leases, namely, Baidoo, Ageewah, Subirihu and Impatassie.

In the meantime the properties of the Bansu Properties Ltd. had been surveyed and it would appear that they do not overlap any portion of our original Baidoo property, but it is clear that Chief Ghante has absolutely no knowledge of the area of the district over which he is Paramount Chief, and has from the documents above mentioned leased twice over the same property to different people.

The result is that in attempting to save our properties by obtaining certificates of validity we have practically bought them three times over, besides spending some £40,000. in development work on the Baidoo and Impatassie properties.

The following are the respective official enquiry Numbers by which these concessions are known before the Courts, viz:-

161,		Ageewah	
164,		Impatassie	
169,		Baidoo	
448,		Subirihu	
210,	Cape Coast	Ehyirebaka	
764,	" "	Tua	
765,	" "	Okkubeybaka	
73,	" "	Ekkubeybaka	
74,	" "	Kukubeybaka	
407,	" "	Yeransoo	

N.B. It should be mentioned that no one is seeking to disturb the Company or asking for possession of the Baidoo propertys and except for the provisions of the Concessions Ordinance 1900 the Company could probably maintain possession.

APPENDIX VGOVERNMENT NOTICE OF 1895
PROHIBITING LAND GRANTS FOR INDUSTRIAL PURPOSES
(C0879/46/19540 : enclosure in no.32)

GOVERNMENT NOTIFICATION

Whereas grants and concessions have been made by Chiefs within the Protectorate without the consent of the Governor of the Colony -

Notice is hereby given that no document hereafter made purporting to grant or convey any right over or interest in land, save and except the right to occupy agricultural land for the purposes of Native husbandry or the right to occupy building land for the erection of a Native house, will be recognised in any way by the Government unless it shall bear the signature of the Governor, or of such officer as he shall appoint for the purpose, in token of her Majesty's approval.

Grants and Concessions already made without such consent will be recognised only to such extent and on such conditions as may hereafter be determined, but the grantees of rights in respect of which there is a reasonable prospect of efficient and continuous work being done within a reasonable time will receive all due consideration.

By his Excellency's Command,

F.M.HODGSON,

Colonial Secretary.

Colonial Secretary's Office, Accra,

October 10th, 1895.

APPENDIX VISURVEYING THE MINING PROPERTIES : A DESCRIPTION

(Extract from "We Two in West Africa" by Moore and Guggisberg, 1909: 158-164).

The work of marking the boundaries of the mining properties had been carried out by my husband's department, the Gold Coast Survey. It was, indeed, the *raison d'etre* of that party, and was of such a peculiar nature that I believe a short account of how it came about and how it was done will interest the lay reader, besides showing him how it was that such a small colony as the Gold Coast came to spend more money on survey work than other larger and more important parts of the empire.

For many years European companies had been taking up blocks of land for gold-mining purposes. This meant that a company entered into an agreement with the tribe to which the land belonged to lease the ground for a number of years at a certain rent, the agreement being made legal and receiving the sanction of the Government by going through certain formalities in the European judge's court.

Now, if you take up land in England or any other open country, it is comparatively simple to run a fence or wall about it, or to set up stone pillars at the corners, or, if you do not want to do even that much, to mark its position on a map. Anyway you can take some simple steps to show people that the land is yours. On the Gold Coast, however, it is quite a different matter; your measures must be heroic.

To begin with, there was no reliable map in those days. Then, to build a fence or erect marks around a property in a forest so dense as to require cutting through, and of such rapid growth as to cover any landmark in a few months, would not only necessitate great labour but would be of little use in warning newcomers that the ground was reserved.

To meet the peculiar circumstances of the case, the Government decided that the mine boundaries were to be avenues, at least 8 feet wide, cut through the forest, and marked with boundary posts bearing name-plates at every thousand feet. It was understood that this

boundary should be cut and the concession properly surveyed before the company could obtain a document called a certificate of validity, entitling it to the full use of the land, but otherwise no steps were taken to enforce the early execution of the work.

Now, cutting a boundary for nine or ten miles around a concession was an expensive undertaking, so nearly all the companies deferred the operation. Year by year more properties were leased and more companies formed until such a state of chaos arose as has seldom been equalled in any country.

What happened was something like this. Some European prospector, I will call him Mr Brown, would find good evidence of gold at a place, say, half a mile east of Odumase village. He would go to Chief Adu of Odumase, arrange with him for renting a block of land of five square miles around his find, and pay him a sum of anything between £5 and £50 on account. A little later Mr Brown would go through the necessary formalities before the European judge and the lease of Odumase Concession would be filed in the court. Then off would go Mr Brown to Europe, with a box of gold specimens, to sell his mine or float a company as the case might. A few months later along would come Mr Jones to the same village and start prospecting. About a quarter-mile west of the village he would find sufficient traces of gold to warrant his leasing a five-mile block around that spot from Chief Adu. Inquiring the name of the village he would be told it was Adukrom, for every Gold Coast village has two names, one the name of its chief and the other coming from some other cause. In this case, Krom being village, Adukrom meant the "village of Adu"; and Ase meaning near, Odumase meant the "village near the Odum tree".

Leaving a payment on account with Chief Adu, Mr Jones would travel down to the Coast and go through the same formalities over "Adukrom Concession" before the judge as Mr Brown had done with "Odumase". The judge would file the lease, never guessing that the two concessions covered practically the same ground. How could he, with no map to guide him? Then, off would go Mr Jones to Europe to float a company to work "Adukrom Concession".

The fun began when Brown's and Jones' respective companies began active operations and discovered that they owned the same piece of ground. And as this was happening all over the mining districts

the Courts of Justice soon began to assume a festive aspect. The chiefs, loving a law case like all natives do, turned up in force, followed by their elders, brothers and cousins; the mining companies paid heavily in fees, and the native barristers grew eloquent and fat - stoutness and wealth keep pace with the native. It was all very well for them and the chiefs, but the British public's money went like water and companies meaning work were paralysed by uncertainty. Upwards of a thousand concession leases were filed in the courts and no Government official knew where any of them were - no one whose duty it was to do so existed.

It was into this chaos that Major Sir Matthew Nathan, R.E., stepped when he was appointed Governor in December 1900. The action he took was immediate and decisive, and resulted in the arrival in 1901 of Major Alan Watherston, R.E., and a party of Sapper officers and men to survey the mining district.

The task before Major Watherston was a heavy one. A country absolutely unsuited to any kind of rapid survey, a confused mass of concessions to sort out, and a tangled skein of legal complications and Government red tape to unravel. He threw himself into the work, however, with the energy and cheeriness born in the man, and with axe, pencil and knife soon solved the difficulties just enumerated. There was many a mining company that owed Major Watherston a debt of gratitude for the rapid way in which he extricated it from its troubles.

With the small party that had been hastily gathered together it was only possible in the first season to survey a line along the sea-coast and to send a couple more into the interior through the mining district, on to which to base or tie the surveys of the concessions. In the following years the Sappers were reinforced by a large party of Queensland and New Zealand surveyors, skilled men and old hands at the game. With about forty Europeans and 700 natives divided into ten parties, the work went right merrily, survey operations being carried on during the dry season from October to May, the remaining four months of rain being spent away from the "Coast", one on the voyage home and out, and three months on leave, or in mapping work in London.

The work of mapping the Gold Coast was probably one of the most formidable tasks a surveyor has ever been called on to tackle, as the country is undoubtedly the most difficult in the world to survey.

In open countries where villages, hills, and other features of the landscape can be seen miles away, map-making is a comparatively easy business, but it is quite another matter when you are buried in a dense forest and can only see, with luck, ten yards ahead.

I do not mean to say that forest surveys have not been executed in other parts of the world, for they have been successfully carried through. But in those cases it was possible to circumvent the forest so that only a few of the survey lines had to be driven through it, nor was the forest so thick and the climate so bad as in the Gold Coast. There it was a question of cutting your way, seemingly blindly, day after day, week after week, in one monotonous grind in the damp gloom of the tropical forest. The lane so formed was accurately measured with surveying instruments, and was slowly pushed on at a rate of about a mile a day until it met another lane, cut by some other party which, starting about fifty miles from the first, had gradually converged on to it by pre-arranged plans.

These surveyed lanes formed a kind of skeleton framework on which to build the map of the country. Bush tracks, streams, and villages in the neighbourhood were rapidly surveyed from each lane by the junior surveyors with magnetic compasses and steel chains, natives being ultimately trained to do this part of the work.

A mining concession was surveyed in somewhat the following manner. Starting from the point which the lease showed to be the datum of the property, and which was generally marked by the shaft or pit where the prospector had originally found the gold which had made him take up the land, the surveyor cut and measured his way through the forest until he knew by his calculations that he was on the spot where the boundary should be. Then he would cut this boundary in the correct direction, measuring and calculating as he went, until he arrived at the point where the corner should be. Here he would change his direction again, and cut on to the next corner. Proceeding on this system he would eventually arrive at the place where he started the boundary, if his calculations and measurements had been correct. The only thing then remaining was to cut another lane to join the boundary to one of the main survey lanes previously described so that the concession could be placed on the map.

The reader can imagine what wearisome work this must have been, especially if a surveyor lost his assistant and had no white man

to talk to. The monotonous slogging away at the "bush", the minute eye-wearing work with the instruments, the endless calculations, the close hot-house atmosphere, the eternal gloom, the lonely evenings, the heavy sweating sleep in the still damp of the nights.

Small wonder that, after eight months of this, the "coaster" gives a whoop of joy on seeing the smoke of his homeward-bound ship on the horizon and behaves like an excited boy on his voyage home.

APPENDIX VIIPETITION FROM MINES EMPLOYEES UNION, 1946(Source: Gorman Award, 1947, Exhibit 'A')

THE GOLD COAST MINES EMPLOYEES UNION (REGISTERED)

HEAD OFFICE, ABOSO

Secretary's Office,

P.O. Box No. 1,

Aboso,

The Secretary,

7th June, 1946.

The Gold Coast Chamber of Mines,
Tarkwa.

Sir,

I am directed by the Executive Council of this Union to inform you that it is their desire for a deputation of selected members to meet your Chamber on the following matters:-

- (1) Wages (a) maximum of the rates of wages of the Surface and Underground labourers to be raised to 3s and 3s 6d per day respectively.

Surface Rate Minimum rate	1/9
Underground	2/0
- (b) That a general increment of 1s may be given to the employees to stand in substitute of the War Bonus thus ignored the African Miners since the outbreak of the War.
- (2) Hours of work - Forty-two hours a week for both surface and underground workers.
- (3) Overtime - Government method and practice to be adopted.
- (4) Holidays - (a) All public holidays so declared to be observed and enjoy with full pay.
 - (b) Annual leave - The following vacation leave should be granted with full pay.
 - 6 weeks to Headmen.
 - 4 weeks to skilled and clerical workers.
 - 2 weeks to Labourers.

- (c) The travelling expenses for employees going on leave be borne by the Company.
- (d) That an employee of regular attendance being temporary sick must be considered for pay provided the Medical Officer's certificate is available.
- (5) Gratuities - After five years' continued service a worker be eligible for the award of gratuity calculated on the basis of one-twentieth of a month's pay for each completed month of service.
- (6) Deduction of Trade Union Contribution from Wage Sheet to be favourably considered.

Yours faithfully,

S.M.BISSAH,

General Secretary.

APPENDIX VIIITHE CLOSURE OF TAQUAH & ABOSSO MINE :ATTITUDE OF THE MINES EMPLOYEES UNION(Source: 1956 Board of Enquiry, Appendix 9)

GOLD COAST MINES EMPLOYEES UNION

Secretary's Office,
Headquarters,
P.O.Box 276,
Tarkwa,
5th January, 1956.

No.MEU/HQ/Vol.2-076/56
The General Manager,
Gold Coast Chamber of Mines,
P.O.Box 73,
Tarkwa.

Dear Sir,

TARQUAH AND ABOSSO CLOSING DOWN

The National Executive Council of the above Union in session on the 3rd January, 1956 directs me to inform the Gold Coast Chamber of Mines and its member TARQUAH & ABOSSO MINES LTD. that the intention of its directors to cease pumping so as to allow the underground workings to flood in order to make it impracticable to re-open the Mines thereafter, is of no serious problem to the Union.

It is the Union's sole responsibility to regulate the wages of the work people and to improve upon the existing poor conditions in the mining industry. It therefore falls outside its responsibility in matters of such as confronts the directors.

It should be noted that Taquah and Aboso Mines as party in this trade dispute cannot at the last resort evade the present crisis by closing down. If this were to happen the Union will not compromise on the claim of 15 per cent general increase with a retrospective payments as from 13th October, 1953.

The Council wishes to emphasize this point that the workers of the Taquah and Abosso Mines would only return to the Mine after the closing down for any specified work upon special and favourable agreement being reached between the Union and the Company.

Yours faithfully,

for: GOLD COAST MINES EMPLOYEES UNION

(Sgd.) J.K.MENSAH

General Secretary.

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