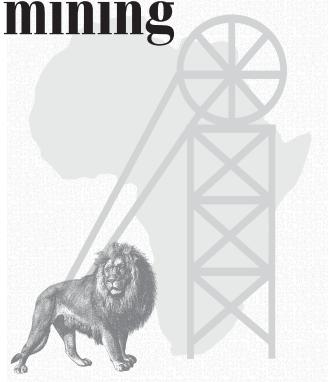




Organization of small scale mining activities in Ghana

by H. Appiah*



Synopsis

Small scale mining (SSM) has been going on for a long time in Ghana. SSM was legalized by the PNDC Law 218, 1989. Since then there have been numerous gains from the SSM industry. The SSM is organized locally by the concession owner who engages people to work for the gold which he buys. Small scale miners (SSMs) use crudely made sluices in Ghana and, therefore, their production falls below what is expected. The SSMs work in groups and not as cooperatives, as they do in Brazil and other Latin American countries. Legalization of SSM has curbed gold smuggling considerably because a gold marketing entity is available. SSM poses certain environmental problems like pollution of water bodies and soils by mercury and indiscriminate digging of pits.

Introduction

Previous SSM activity

Ghana is located in the West African subregion and shares borders with Burkina Faso in the north, Togo in the east, Cote d'Ivoire in the west, and the Atlantic Ocean in the south. Small Scale Mining (SSM) activity in gold has been known in the then Gold Coast (now Ghana) for centuries. There is evidence that gold was being exported in the sixth century B.C. but diamonds were not discovered until 1919 by the Geological Survey¹. Alluvial gold was being mined on river terraces and flats in Ashanti and other regions. Our forefathers were digging for gold and collecting gold nuggets. These were kept in earthenware pots and buried in the ground for safe keeping. Ghana derived its former name the 'Gold Coast' from the abundance of gold and trade in gold with earlier Europeans who visited the country.

Until 1989, and after the Kwame Nkrumah era, small scale gold mining (galamsey as it was called) was deemed to be illegal. The government declared that any person could farm the land but any mineral that was won from the ground belonged to the state and therefore an individual who was found to possess gold was in breach of the law. On the

other hand, licences were granted for diamond mining and hence concessions were leased out to individuals. These individuals were supposed to sell the diamonds to the Diamond Marketing Board which was the sole agency for the purchasing of diamonds. SSM activity was widespread in the mining areas especially in old tailings dumps and adjoining lands. In these areas, some of the SSMs mined the gold-bearing quartz, pounded them in metal mortars (Figure 1) and extracted the gold by means of mercury. It is worthy to note that our forefathers recovered the gold by means of a bowl shaped vessel called 'krowa' which is like the Brazilian batea. The final cleaning of the gold was done by the goldsmiths who also refined the gold and used it for jewellery. No mercury was known to have been used in the olden days.

Operations

Small scale mining in Ghana is characterized by inadequate capital inputs, low level and



Figure 1—A small scale miner pounding rock (ore) in a metal mortar with a metal pestle

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Figure 2—The 'krowa' used by small scale miners for panning gold and washing diamonds. The lady in the picture is panning alluvial material



Figure 5—Small scale digging a pit for soil that is going to be treated after dumping it on one side of the pit



Figure 3—A typical sluice box and hopper being used by a small scale miner. Note how the area has been littered with pits and trenches.



Figure 4—Women using the 'krowa' for recovering gold and diamonds in a pool of water

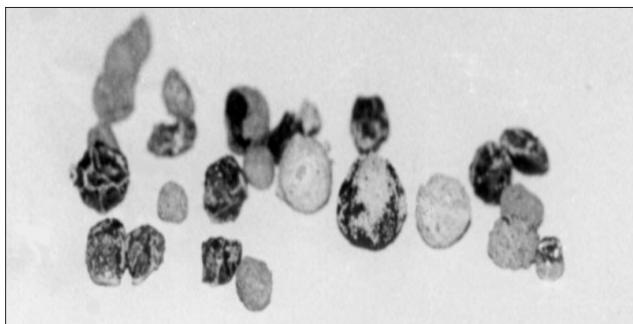


Figure 6—Balls of gold recovered from amalgam. Note the dirty nature of some of the balls (black)



Figure 7—Brass pan for blowing sand and other useless material from alluvial gold concentrate



Figure 8—Weights used for weighing gold by small scale miners and some goldsmiths

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inappropriate technology³. The operations of the SSM are twofold; there are those who use the 'krowa' (wooden bowl carved out of tree stem) like the Brazilian 'batea' (Figure 2) and those who use crude sluice boxes and hoppers (Figure 3). Those who use the 'krowa' wash the material the way any gold pan is used. Women are very effective in using the 'krowa' for the recovery of both gold and diamonds (Figure 4). A group comprises 4 to 6 people. Initially they dig the land, scoop out the soil and dump it on the side. The soil is handled three or four times. First, after the soil has been dug and dumped to one side of the pit (Figure 5), some is put back into the same pit, and water is added. This is to muddle the clayey soil. The SSM stand in the pit and stamp on the soils in order to make it into a slurry. The slurry is then put into the hopper on the sluice box and buckets of water poured on it for it to run over the board. The hopper is built with holes (about 6 mm) on the under part so that any oversize material is trapped and later discarded. The oversize material is carefully examined for gold nuggets. On the sluice box is a blanket or a cut jute sack, which traps all the heavy minerals from the slurry that runs over it. A careful observation has shown that SSM do not use too much water for fear of losing some of the fine gold. Gold from sluices is concentrated by using a smaller 'krowa' or the gold pan. The concentrate obtained is amalgamated with mercury. After this the amalgam is burnt in the charcoal fire. The ball of gold that remains is unrefined and this is what is sold (Figure 6). There are also some people who do not use much mercury but rather use the blowing and tapping method using a specially fabricated brass pan (Figure 7). This is the best method but eventually some people still resort to the use of mercury, after the blowing and tapping, because of their inefficient cleaning.

A group can work about five cubic metres a day. On the average one person earns about \$7.00 per day. Below are the prices for various types of gold;

- 7.75 grams or 1 pound of unrefined amalgam gold \$60.00
- Refined 1 pound gold \$70.00
- Cleaned alluvial gold (1 pound) \$65.00
- Uncleaned alluvial (1 pound) \$60.00

The PMMC buys only smelted and not alluvial gold.

Following are the weights and measures and their equivalents used by goldsmiths and small scale miners.

- 1 benner 63.0 g (two ounces)
- 1/2 benner 31.5 g (one ounce)
- 1 pound¹ 7.75 g (a quarter of an ounce)
- 10 shillings 3.88 g (an eighth of an ounce)

The untold success story of Abosso Goldfields Limited (AGL) is that the company organized and implemented, in November 1996, the Small Scale Mining concept for the galamsey (illegal miners) groups in the local communities who were on their property illegally and were causing problems in their pits. The company identified, registered, regrouped the SSMs and issued them with AGL small scale miners' identity cards. Initially, a total of seven hundred and forty small scale miners were registered. The SSMs at AGL, mined both alluvial and consolidated gravel manually, using basic hand tools like hammers, moils and shovels. Use of explosives at all designated faces is strictly forbidden. SSMs

Table 1

Gold and diamond production by Small Scale Miners from 1990 to 1996

Year	Gold (g)	Diamonds (carats)
1990	556	484,877
1991	600	541,814
1992	558	442,266
1993	1,134	376,400
1994	3,029	337,457
1995	4,151	381,869
1996	3,871	300,000
Total	13,899	2,864,683

are supervised and trained in safety operations in both alluvial and reef mining. The gold obtained by SSM operations are purchased by a commissioned PMMC agent, so that AGL can submit monthly production returns, to the Minerals Commission and Mines Department. The gold production by the AGL Small Scale Mining operations for the year 1997 was 1309 ounces. Table 1 shows production of gold and diamonds by small scale miners in Ghana from 1990 to 1996.

Organization

The enactment of the PNDC Law 218 of 1989² legalized SSM activity. This law also empowered the SSMs to sell gold to authorized dealers such as the Precious Minerals Marketing Corporation (PMMC), the marketing agency for gold and diamonds. Hitherto, there was no marketing outlet for gold as there was in the case of diamonds so almost all the mined gold found its way out of the country into Togo, Ivory Coast, Nigeria and Europe. Gold used for jewellery was purchased only from the local banks in those days. The establishment of the gold marketing agency has changed this situation. An estimated 200,000 small scale miners (SSMs), before this law, produced 20,000 g. of gold and 990,000 carats of diamonds annually (Peters, personal communication, 1989). The government realized that SSM was not going to cease, hence the need for legalization.

The production of gold from SSM has contributed favourably to the economy of Ghana. Now SSM centres have been established throughout the country by the Minerals Commission to monitor their activities and technically guide them in their operations.

In the organizational aspect, SSM is worked out in the following manner. A person, who intends to embark on SSM, contacts the chief of the area for a property that he wishes to work on. All the necessary customary formalities are performed, a site plan of the area in question is drawn and submitted to the Minerals Commission for search and approval. An area of 25 acres is the maximum allowable area that is allocated to each person or group of persons as a concession. After the concessionaire has obtained the plot of land, he engages a headman or headmen who, in turn, engage people to work on the property in line with the tributer system. This is the system whereby the owner charges a fee from the workers who intend to work there. After this minimal fee, the tributer is supposed to sell his

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gold winnings to the concession owner, who buys it at a price lower than the current market price. The concession owner in turn refines the gold and sells it to the PMMC, the marketing agency. Gold sold to the concession owner is largely unrefined.

There are no SSM co-operatives in Ghana as there are in some Latin American countries. Rather, the people work in groups or gangs comprising four to six people per gang with one foreman or leader, who is normally a friend. Also, you can have group members made up of a family: say a man, wife and son or brother. When a concession owner has no interest in buying gold, he charges the small scale miners (SSMs) on his property a standard fee per head per week and the SSM markets his own gold. The concession owner has to account for work done on the concession allocated so he normally keeps records of gold sold from his property.

Environmental issues

SSM has caused a lot of harm to the environment by way of polluting water bodies and causing destruction of expensive farmlands (Figure 3). Pits are dug haphazardly and remain uncovered even after their operations. Also, there is the incidence of the pervasive use of mercury in Ghana. In one of my prospecting works in the field, a pit dug revealed the presence of mercury in the soils. This indicates the amount of pollution by mercury that one encounters when the SSMs have worked in an area. A simple, efficient and fast method of separating gold from alluvial concentrates without the use of mercury has been developed by the School of Mines, Tarkwa, Ghana and New Mexico Institute of Mining and Technology, U.S.A.⁴

Conclusion

The legalization of SSM in Ghana has considerably reduced the incidence of smuggling of gold in Ghana. There are also considerable financial gains and little villages have prospered within a short period of time. Most of SSM are retrenched workers from the mining industry, and other citizens are from cities. Due to SSMs, the rural-urban migration has dropped considerably.

Acknowledgements

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An ever-widening circle of research collaboration*

The University of the Witwatersrand's School of Process and Materials Engineering is set to reap the benefits of greater overseas research collaboration following on Professor Hurman Eric's recent sabbatical in The Netherlands.

Prof. Eric who is Head of the School of Process and Materials Engineering left in January on a six-month sabbatical at the Delft University of Technology in Holland. There, as visiting professor in the Faculty of Applied Earth Sciences, he was involved in lecturing two courses offered to senior students covering the principles of pyrometallurgy and modelling simulation and control of high temperature processes.

The result of these activities was an invitation from the Delft Technical University to Prof. Eric to return annually to repeat, as a block release, his high temperature processing pyrometallurgy course over a four-week period.

While absent from South Africa Prof. Eric also received an invitation to serve on the international advisory

committee of a major prestigious conference—the Sixth Annual Conference on Molten Slags, Fluxes and Salts to be held in 2000 at venues in both Helsinki and Stockholm. 'As an advisory committee member, one of my major goals will be to influence the staging of this conference in South Africa in 2003.'

During his absence, his own Pyrometallurgy Research Group participated in Infacon VIII—the prestigious international Ferroalloys Congress held every three years—at which event 3 papers were submitted. ◆

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