

REVIEW OF THE SMALL SCALE GOLD MINING PRACTICES AT CINEAM AREA, TASIKMALAYA REGENCY, WEST JAVA, INDONESIA

By

R. Hutamadi, Sutrisno, Bambang N. Widi, Sabtanta J.S.

Center for Geological Resources

Abstract

Gold deposit at Cineam area is an epithermal gold deposit of low sulphidation type which lies about 180 km southeast of Bandung at an elevation of 400 meter above the mean sea level. The Cineam deposit is administratively belongs to Cineam Subdistrict, Tasikmalaya Regency, West Java Province, which dominantly occurred within volcanic rocks unit of Jampang Formation. Alterations developed in this area namely propylite, argillic, sericitation, and silicification, occurred in andesitic lava, volcanic breccia, and andesitic to dacitic tuff. The thickness of gold bearing quartz veins are commonly from few cm up to > 20 cm, while for the veins of higher grade of gold content the thickness are about 5 cm or less. The average grade of gold content is around 6 - 10 gr/t Au. Although Cineam gold deposits can not be classified as a big scale deposit, its mineral genesis has an interesting characteristic to be further studied. The Cineam area representing one of the most prospect areas of gold found in the eastern part of West Java Southern Mountain Range.

As the Cineam gold deposit is proportionally suitable for a small scale gold mine, the local government had already gave a mining license to a Family Firm in the form of a Village Unit Cooperation or "KUD" such as KUD Mekarjaya which had also been updated to become a B class of Exploitation License category that permitted for the realization of metallic exploitation. This action was in line with the implementation of Autonomy Policy since the year of 2001.

Although KUD Mekarjaya's mining production is relatively so small but in fact the mining activity is still being maintained to be daily earnings for the local gold miners to rely on. Within the long run of the local gold miners activity at Cineam which has been working since 1968, this condition can give rise to many well skilled and experienced labors in seeking for gold ores, in handling small scale gold mining works, and in obtaining for the bullions. In other side, on the contrary, there are some negative actions must be kept under control such as the disposal of the waste or tailing directly into the river and the unsafely process of heating the amalgam to obtain the bullion including other improper ways done during the handling of their mining activities. Since the whole mining operation so far generally financed by individual investors it is very likely that small scale gold mining lacks of the capital needed for the mining operation. This condition is what the KUD always facing with so that management and financial matters can be a very serious problem affecting the progress of the KUD Mekarjaya. From some presentation given by the CCOP-CASM Meeting in Bandung we can compare the condition of small scale mining in Indonesia, and that from other countries which have conducted good management in mining regulation and policy in relation with licensing, mining workers, tax payment and awareness of environment live in the vicinity of mining areas

On account of that event this can be expected to motivate and encourage the policy and decision makers either locally or centrally throughout Indonesia in giving more attention related to the guidance, monitoring and inspection of the implementation of small scale mining activities which is actually growing in numbers.

1. Introduction

Cineam epithermal gold deposit as an epithermal deposit of low sulphidation type lies about 180 km southeast of Bandung at an elevation of 400 meter above the mean sea level. The Cineam deposit is administratively belongs to Cineam Subdistrict, Tasikmalaya Regency, West Java Province as illustrated in Figure 1. Although this deposit is proportionally suitable for a small scale mine type, it plays an important role in relation with gold bearing mineral formation occurring in the eastern part of West Java which is part of the Java regional mineralization series. Historically,

mineral deposits with gold prospect were found in 1968 through the panning of gold placer by local miners at Citambal River and its tributaries. The finding of the gold prospect was followed up by an exploration conducted by a work team of Directorate of Mineral Resources (DMR) who finally found primary type of gold deposits at Citambal and Cengal in 1970. Other subsequent explorations also conducted after that time either by government institution or by private company.

From mineral association available in this area, the coverage of Cineam gold deposit, basically, involving that of

three separate blocks or locations namely Cikondang block located at the northern part of the area, Citambal-Cikurawet block at the central, and Ciseel block at the southern part of the area. The Cineam area representing one of the most part of the Java regional mineralization series. Historically, mineral deposits with gold prospect were found in 1968 through the panning of gold placer by local miners at Citambal River and its tributaries. The finding of the gold prospect was followed up by an exploration conducted by a work team of Directorate of Mineral Resources (DMR) who finally found primary type of gold deposits at Citambal and Cengal in 1970. Other subsequent explorations also conducted after that time either by government institution or by private company.

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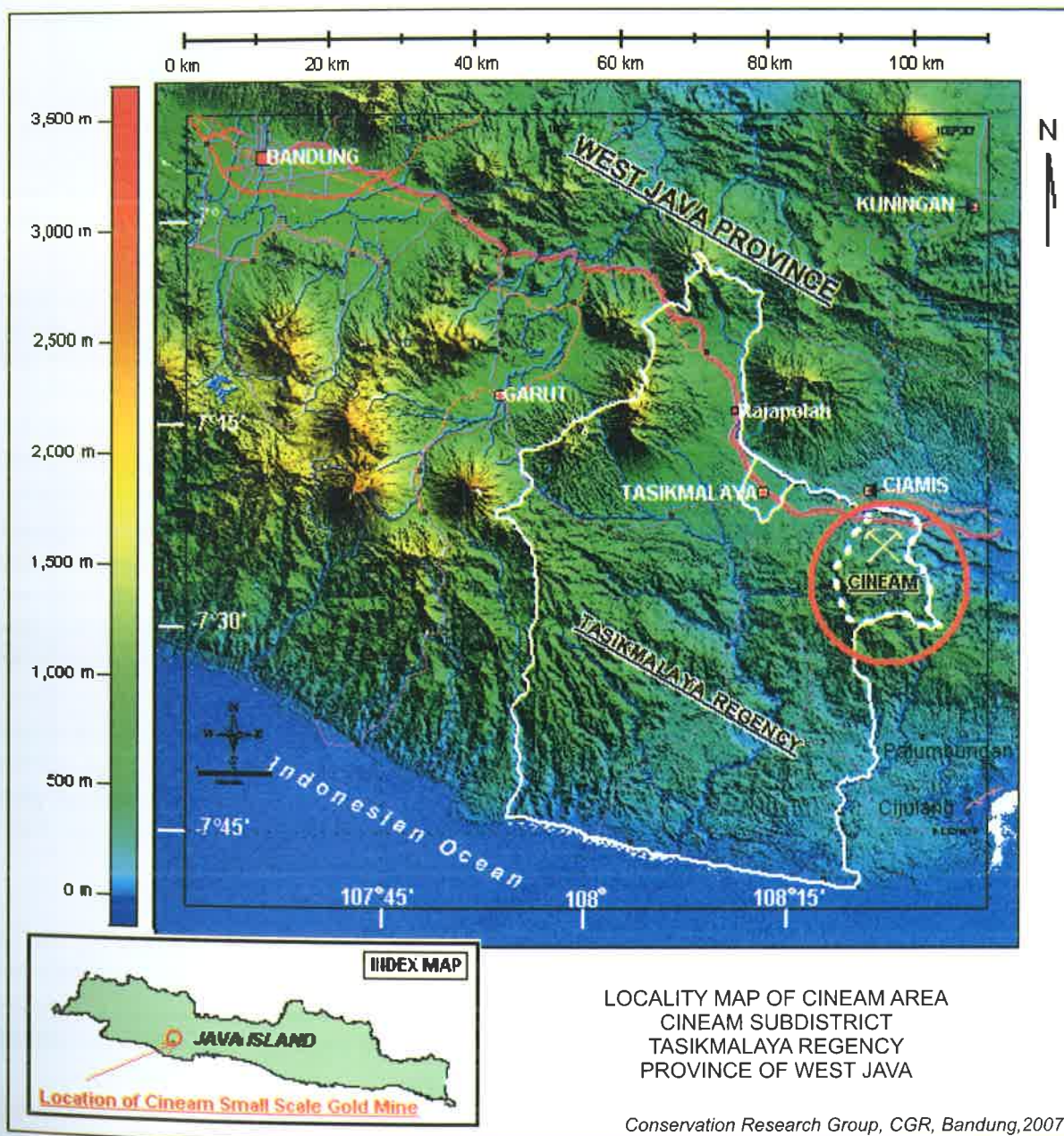


Figure1. Location map of Cineam area (the basemap is adopted from the DEM source map)

bearing quartz veins are commonly from few cm up to > 20 cm, while for the veins of higher grade of gold content the thickness are about 5 cm or less. The average grade of gold content is around 6 - 10 gr/t Au. Although Cineam gold deposits can not be classified as a big scale deposit, its mineral genesis has an interesting characteristic to be further studied.

The Cineam deposits has currently still been giving a good prospect to the local gold miners, but unfortunately, due to lack of capability in exploitation technology and developments and also for financial resources, the mining activity needs much help to overcome for the problem.

The visit of CCOP-CASM Asia (Coordinating Committee for Geoscience Programmes Community Artisanal and Small Scale Mining) delegates to the Cineam area in relation with the event of "CASM-Asia Workshop on the State of the Art of Science and Technology to Protect the Environment and People" which held in Bandung in the 29 th November 2006, has given encouragements including some comments and suggestions to the local gold miners. Inefficiency of handling the process of gold mining and tailing treatment that constituting a serious problem should be solved soon before getting through the next step in relation with the enhancement of the mining production.

2. Geology

Geology of Cineam belongs to the eastern region of the Southern West Java Mountain Zone in which the physiographical condition is made up of two major belts called as Middle-Southern Mountain Belt in the south and Volcanic Belt in the northern part.

It is stated that Cineam area is also belonging to the volcanic belt (JICA-DMR,1995). At the southern and middle district the rocks mainly composed of Oligo-Miocene Jampang Formation volcanic series, while volcanic members of Jampang Formation consist of andesitic to dacitic rock types (Bemmelen Van, 1949). These groups of rocks were intruded by diorite, granodiorite, andesite, and dacite (Figure 2). The Volcanic Belt at the northern part is mostly occupied by quaternary rocks with andesitic to basaltic in composition consisting of volcanic breccia, andesitic lava and tuff which is then called as "Old Volcanic Rocks".

This area, tectonically, has at least twice experienced that of orogenic events in which the first orogenic event was in the Middle Miocene resulted in the uplifting phase that followed with intrusions of granodiorite, diorite, dacite, and andesite which also accompanied with folding and faulting as well as hydrothermal activities within Jampang Formation where precious and base metal mineralizations took place. The

second event was the young volcanic formation as a product of the last tectonic event.

The geology of Cineam area itself as part of the lower member of Jampang Formation is principally composed of six rock units in which three units out of the six are intrusive rocks. The rock unit descriptions is as follows:

- Tuff intercalated with dacitic lava and breccia unit, occupying the central area mainly at Cisarua, Cikurawet until Balekambang and Cipateungteung, is considered to be as the oldest rock unit.
- Basaltic -andesitic lava occupying the southern area (Ciseel) and the western part of Cineam area is characterized with gray to dark gray in color that composed of plagioclas, pyroxene, feldspar and hornblende as main phenocryst.
- Andesitic tuff -breccia and intercalated tuffaceous sandstone, in which locally they are widely disseminated from the south to the north part. This unit is typified by intercalating andesitic tuff -breccia with tuffaceous sandstone that locally mixed with andesite altered fragment.
- Diorite which is well exposed at the upstream of Cihorang river megascopically shows gray to brown color, composed of biotite, plagioclase, quartz and hornblende grains. In certain areas such as in Ciseel hill, the rock has strongly altered, so it is very difficult to recognize the original of those minerals due to their changing into sericite, kaolinite and carbonate.
- Dacite which forming a big stock exposed in the northern and southern part of the area is brownish white to pale, consisting of plagioclase, biotite and quartz uehedral crystals as phenocryst within plagioclase groundmass. This dacite had intruded the host rock volcanic breccia.
- Hornblende andesite which is well developed in the north of G. Kembang is gray to blackist gray, porphyritic in texture, composed of plagioclase, hornblende and pyroxene phenocrysts that sink in plagioclase groundmass.

Geological stuctures developed in this area are anticline located in the western part and oblique fault in the eastern area. These structures assumed to have played an important role in relation with hydrothermal mineralization in this area.

As a result of chemical reaction between the wall rocks and hydrothermal fluids passed through it and precipitated within the rock fractures gave rise to the occurrence of alterations in this area in the form of propylitization,

sericitization. In this case Jampang Formation is considered to be as a very favorable media where gold bearing hydrothermal fluids precipitated. These kinds of alterations are typical of an epithermal low sulphidation type.

Mineralization in this area is indicated by the occurrence of sulphide minerals bearing quartz veins within the host rocks that generally trending from N 330 to 350E and dipping from 60 to 90. The thickness of the veins varying from few cm up to 60 cm and in average of about 10 cm to 20 cm. Mineralization is characterized by the presence of a

number of mineral bearing quartz veins and silicified rock within host rock lava, volcanic breccia and tuff, consisting of electrum, pyrite, pyrargyrite, realgar, stibnite, and pyrite in the northern area; proustite, galena, hessite and petzite, arsenopyrite, tetrahedrite, chalcopyrite, sphalerite and pyrite in the central area; and chalcopyrite, electrum, sphalerite, tetrahedrite and pyrite at the southern area. Veins of epithermal gold are of about 20-80 cm in thickness with a gold grade content in between 25-30 ppm.

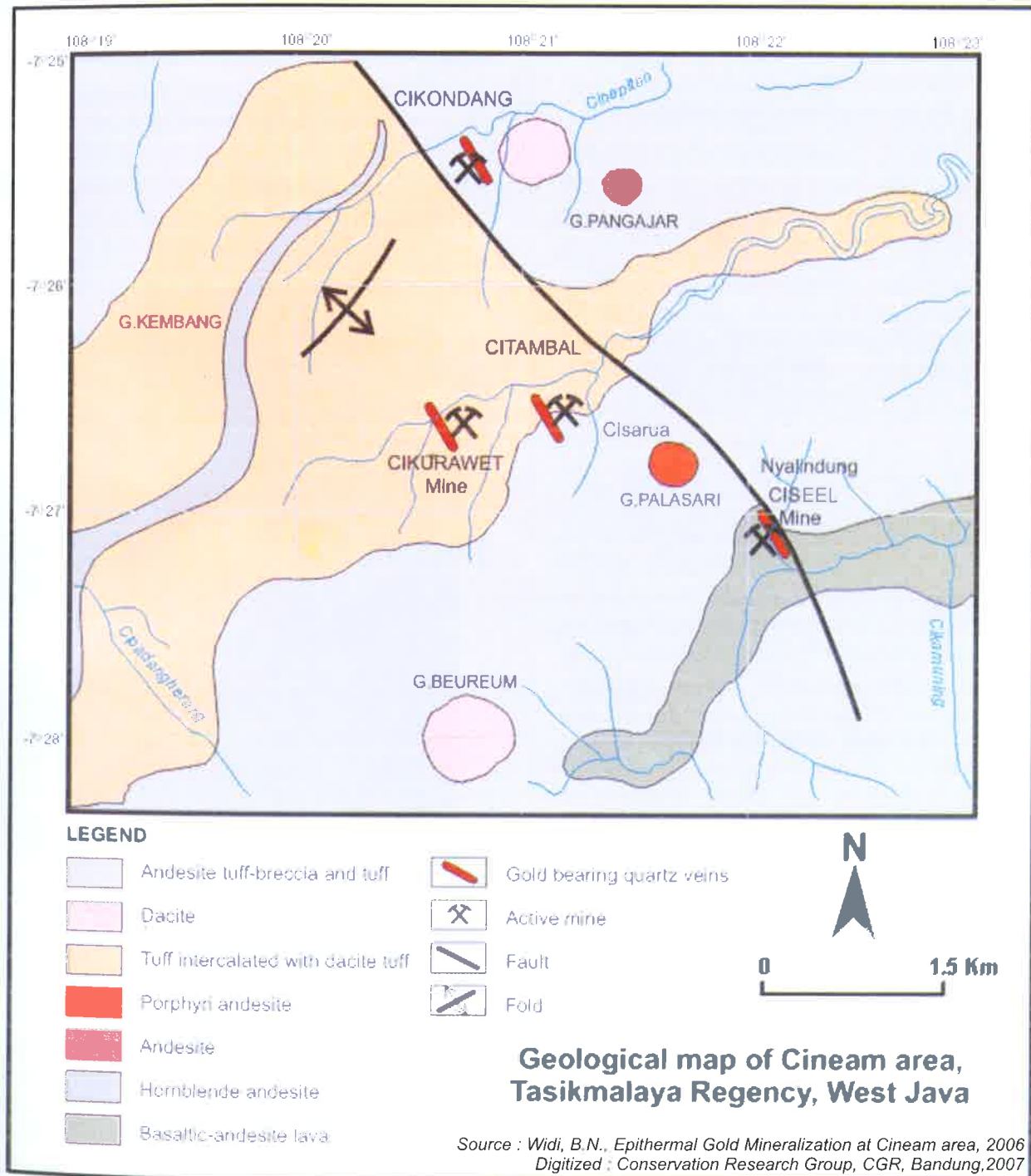


Figure 2. Geological map of Cineam area, Tasikmalaya Regency, West Java.

3. The KUD Mekar Jaya's Small Scale Gold Mine

KUD Mekar Jaya is a Village Unit Cooperation which acting as the holder of the Cineam small scale gold mining activity located around Cisarua, Citambal, and Cikurawet areas, whithin the territory of Karanglayung Village, Sub-District of Karang Jaya. The coverage area of the KUD Mekarjaya's small scale gold mining is around 36.58 Ha with an estimated reserve of about 56,281.762 ton of ore and to be predicted to containing that of about 1,043,426.476 grams of gold. (Report “, PKSDM, 2002, Bimbingan Teknis Konservasi Sumber Daya Mineral di daerah Cineam dan sekitarnya, Kecamatan Cineam, kabupaten Tasikmalaya, prov. Jawa Barat, DIM, Departemen Energi dan Sumber Daya Mineral “)

3.1. Historical Background of the KUD Mekarjaya

The finding of a Cineam gold prospect mining area was in 1968 by several local gold miners who came from Salopa situated not far from Cineam area. Since then some small scale gold mines have been illegally worked out by several groups of local people at some gold spots nearby. These activities have actually been in a good progress and well developed for such small-scale gold mining business until 1982. In this year, to accommodate for the mining activities, the local government was gathering them and gave a mining license to a Family Firm in the form of a Village Unit Cooperation or KUD in the name of Mr. Sopandi.

In 1989 that KUD was taken over by KUD Mekarjaya in which the mining activity was also still running well until the time it changes the firm status into another bigger one.

In 1992 the KUD Mekarjaya's mining license was updated to become a B class of Exploitation License category permitted for metallic exploitation that in Indonesian language known as KP (Kuasa Pertambangan) and issued by the government. This mining activity had been working up to 2002.

In the end, due to the implementation of Autonomy Policy since 2001 the mining authority known as KP had consequently been changed to become IUP (Ijin Usaha Pertambangan).

3.2. Finding of gold ore

A stage of finding for gold ore is not conducted systematically by small scale gold miners. Determination for the gold ore is usually done on the basis of the surface appearance. The veins strike at Cineam area is generally west-east with general thickness of 70 80 cm sporadically until 150 cm. Content ratio of gold to silver is of about 7 to 3.

Distribution of veins and mineshaft locations were determined by each group of miners on the basis of surface



Figure 3. An adit used by local gold miners for extracting gold ore at Cineam area.



Figure 4. A shaft used by local gold miners for extracting gold ore at Cineam area

appearance as well and frequently relying solely on their experiences. Gold content is determined by panning part of the veins using plates or coconut shells which depend on the result of their megascopic observation on either veins distribution or the gold content. From thereon the local gold miners then decided to locate and to direct for the tunnel or shaft for mining the gold. Configuration of a tunnel and a shaft are illustrated in Figure 3 and 4 respectively.

3.3. Mining Activity

Mining activity is started with digging a tunnel towards the direction of gold ore veins. The process from initial excavation until ore production commonly takes about 20 days. The system is underground mining by using very simple tools. Tunnel to reach quartz veins or gold ore draws on wooden support stand. During excavation they are facilitated with a blower for air circulation and submersible pump for drying out the tunnel or shaft.

Gold ore is obtained by using chisel and hammer to extract the ore from the shaft. By using a pulley or other similar type of such tool facilitated with wire and a bucket they pull the collected ore up to the surface. The depth of the shaft at the moment is 30-60 m. At the depth of more than 60 meter, the mining is usually not to be continued due to ground water problem. A group of miners is generally divided into three sub-groups so that a group of workers working in turn with other groups during the 24 hours of working time.

3.4. Ore Processing

Gold ore is processed using amalgamation method. First, the ore is crushed and then put into some equipments which are cylindrical in shape made up of iron called "gelundung" or "teromol" (Figure 5) for pulverizing that of crushed material. After becoming amalgam, process of heating is conducted indoor. Some of local gold miners, even, they heated up that amalgam at the open air.

The price of mercury is Rp. 400.000,-/kg and it can not be found openly at legitimate traders or shops. Mercury contained in tailing is recaptured by heating up, and re-used or sold at the price of Rp. 130.000,-/kg.

Parties who involved with a group of miners can obtain their portion of sharing out in the form of the crushed ore which still need for further processing on their own. These processing are conducted at separate locations using water force generated by water wheels placed at a milldam or a waterfall at river area.



Figure 5. "Gelundung" or "teromol" facilitated for pulverizing crushed ore to become amalgam.

3.5. Production

From personal communication with a small scale gold miner (Pak Syai) who works for the KUD Mekarjaya it was informed in the mid of November 2006 that the result of gold which is still in the form of bullion was estimated to be in average of 50 mg-1gr of gold taken from every single "gelundung" or "teromol". Examples of an amalgam and a bullion are illustrated in Figure 6.

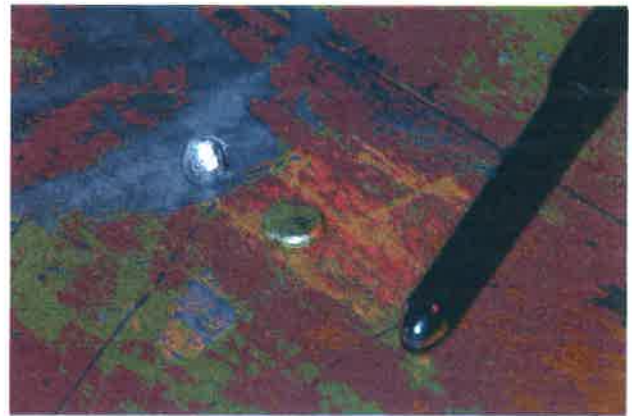


Figure 6. Example of an amalgam and bullion as the final product of KUD Mekarjaya's small scale gold mine.

Although the production is relatively so small but in fact the mining activity is still being maintained to be daily earnings for them to rely on. From a conversation between the local gold miners and the CCOP- CASM delegates in the late of November 2006 it was informed that the KUD's gold production per year was estimated to reach of about 8 kg and the local gold miners were even hoping, if possible, for a financial support from an investor. They stated that if there is a sufficient capital in hand they courageously predicted for the gold production to be three times bigger than what they have been obtaining so far.

Besides, to increase the target of their gold production it is also very much needed some assistances such as technical guidances in mining and processing including treatment of waste/tailing as well because what they have been doing so far with the waste/tailing resulted from their gold mining and processing is just by throwing it out directly into the river.

4. Discussion

Activity of the Cineam small scale gold mining at this time is still running although the mining progress has been remaining steadily. This condition is likely due to several factors affecting that of the mining progress such as the fluctuation of the number of the gold miners which are most of them not fully work for the gold mine, they rather be a seasonal gold miners. Their working days for the mine will be dependent on their primary work in agriculture or horticulture business. In this case, the work for the gold mine seems to be as another choice or alternative in obtaining for another extra daily income.

A different opinion may come from the people who fully work for the gold mine in which they have already taken the risk for whatever they do so that they will never change their mind for taking another job for living. These kinds of people commonly have a lot of experiences from trial and

error in exploiting for the gold ore deposit. This condition of course can increase to many well skilled and experienced labors in seeking for gold ores, in handling small scale gold mining works, and in obtaining for the bullions.

Some similar actions to what has been doing by many illegal gold miners in exploiting gold ore deposits have been conducted as well by most of the KUD's gold miners. As what actually happening so far is mostly in relation with how they cope with the handling of the gold mine especially in the way they disregard the rule of the game related to the application of good mining practice principle.

As the whole mining operation for the KUD is generally financed by individual investors it is very likely that this kind of small scale gold mining lacks of capital needed for the small scale gold mining operation. This condition is what the KUD always facing with so that management and financial matters can be a very serious problem affecting the progress of the KUD Mekarjaya's small-scale gold mine.

Such a type of small-scale gold mining like that of KUD Mekarjaya is believed to be very common throughout the country. By knowing the quantity and quality as well as the accessibility of all small-scale gold mining in the country, it will be possible for the central or local government to manage them for the sake of increasing their socio-economic welfare and environmental impact.

Easiness of getting a mining license from each local government can be a good support for the local gold miners to do for their business. Unfortunately, this is not accompanied with the law enforcement regarding the mining practise by the local government.

Unawareness to the health of almost all miners also find at the KUD Mekarjaya's gold mining although a technical guidance used to be given by the staff of Center for Mineral and Coal Technology Research and Development of Bandung (Masri Ripin, 1996). This situation is very common for such a small scale gold mining and even very much the same through the country.

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5. Conclusion

Mineralization in the Cineam area is an epithermal type which is characterized by the presence of gold and base metal bearing quartz veins occurred in lava and volcanic breccia in the lower part, while tuff and breccia tuff found at the upper part of Jampang Formation. Gold is close associated with sulfide minerals like sphalerite, chalcopyrite, pyrite, galena, realgar and stibnite. Quartz vein with high grade of gold content have thickness of 5 cm or less.

Mining method (exploitation) has been using in the Cineam Mine is underground mining. The ore processing using amalgamation method. The management system of KUD's gold mining is conducted by capital and profit sharing among the KUD's members.

The history of Cineam mining production are fluctuating, sometime the production are increasing and sometime decreasing, depending on the situation or spirit of workers. Even the history of this mine is more than 25 years, some primary problems is still remain like limitation of finance and management, which is consequently influencing the maximum achievement of exploration, exploitation and processing. The negative impact of that conditions such as: unawareness in handling waste materials, water pollution, and unhealthy condition caused by heating up the amalgam at an open air. This can raise a healthy dangerous for the community live around the mining area.

As a comparison to what we have from CCOP-CASM's event it has been presented that in some foreign countries; India and Malaysia have conducted small scale mining regulation and policy in relation with licensing, mining workers, tax payment and awareness of environmental live in the vicinity of mining areas

On account of the CCOP-CASM meeting in Bandung this can be expected to motivate and encourage the policy and decision makers either locally or centrally throughout Indonesia in giving more attention related to the guidance, monitoring and inspection of the implementation of small scale mining activities which is actually growing in numbers.

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