

# **MONGOLIA—FROM ZERO TO 100 000 SMALL-SCALE MINERS IN LESS THAN 10 YEARS.**

**Peter W. Uitterdijk Appel**  
Geological Survey of Denmark and Greenland

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## **Abstract**

During recent surveys in Mongolia, the World Bank and other organisations have investigated the drastic increase of small-scale mining over the last five years. Coal, fluorspar and gold are the main commodities mined. The change to market economy after the collapse of the Soviet system combined with severe weather conditions has changed the means of income of the population from herding to small-scale mining. From almost zero in 1998 there are now about 100.000 small-scale miners Mongolia and the number is rapidly increasing.

Most of the small-scale mining is carried out under dangerous conditions and the widespread use of mercury has caused serious health problems and environmental degradation. Training courses have been held for small-scale miners in recycling mercury and alternative methods of gold extraction. Methods of cleaning small and medium sized mercury spills have been discussed with officials and owners of small gold extraction plants. Teaching and training programmes for medical doctors have been planned in co-operation with the government of Mongolia.

## **Introduction**

Small-scale mining (artisanal) mining is practised in many parts of the World. In 1999 the International Labour Organisation (ILO) estimated that at least 10 million people were directly engaged in artisanal and small-scale mining activities in developing countries, with another 80 to 100 million people directly or indirectly dependent on them. There is a general reluctance of many governments to accept small-scale mining as a necessity for millions of people. The reluctance stems in part from the serious environmental and social problems arising from the small-scale mining activities. There are, however, also significant advantages with well-developed small-scale mining. It supports a large group of people and it significantly reduces the migration from rural areas to cities.

In Mongolia small-scale mining started in 1998 with few small-scale miners, and the number has increased rapidly ever since. Presently an estimated 100.000 depend on small-scale mining. People have had to find their own solutions, most often outside the formal economy. Serious cuts in production of the state owned coalmines resulted in massive loss of jobs and a shortage of coal supplies for household cooking. Many of the mineworkers formerly working in the state owned coalmines thus turned to small-scale coal mining. General loss of job opportunities has forced many people into placer and hard rock small-scale gold mining.

Much criticism of small-scale mining has come from various groups. Commercial mining companies claim that they have problems with small-scale miners exploiting within their concession areas. This is partly true, but in most cases small-scale miners exploit minor deposits which cannot be exploited on a commercial basis by large companies. It should also be pointed out that there are many examples from different parts of the world where small-scale miners have discovered mineral deposits, which have later been exploited by commercial companies. Criticism has also come from central and local government. Criticism from administrative side is mainly on land degradation, pollution of the environment and the social problems arising from small-scale mining. Many of these problems can be dealt with by a good regulatory framework and education of the small-scale miners.

In 2004 the author carried out a survey of small-scale mining in Mongolia for World Bank as part of the Banks Mining Sector study. The World Bank small-scale mining survey was built on another survey carried out in 2003.<sup>1</sup>

## Small-scale mining in Mongolia

A number of commodities are mined by small-scale miners of which coal, fluorspar and gold are the most important.

### Coal

Most of the coal used for household cooking and heating is supplied by small-scale miners, whereas the power plants are supplied by commercial coal mines. The small-scale coal miners mainly work during wintertime where there demand for coal is highest and the conditions for gold mining get too harsh. The main problems with small-scale coal mining are problems with cave-in of tunnels and explosions caused by methane. These problems could be dealt with by teaching of small-scale miners by mining engineers from the nearby commercial mines in how to support tunnels and adits. Fairly inexpensive methane and CO indicators could be purchased and lent to the small-scale coal miners. Small-scale coal mining is almost exclusively carried out by men.

### Fluorspar

Mongolia is one of the Worlds leading fluorspar producers, and small-scale miners contribute with a significant amount to Mongolia's production of fluorspar. Men mainly carry out small-scale mining for fluorspar, but children and women break the mined material into smaller size and bag it. The bags weighing about 1 tonne each are stockpiled until a fluorite dealer comes by. This may take months and the small-scale miners have therefore a serious cash flow problem. One way out of this would be if the Mongolian government allocated micro credits to the small-scale fluorite miners.

### Gold

The vast majority of small-scale miners in Mongolia mine gold either in hard rock or in placer deposits. Mercury is used frequently for extracting gold from hard rock ore, whereas placer gold miners claim that they only rarely use mercury. Sometimes

<sup>1</sup> Ninja miners of Mongolia. Assistance to policy formulation for the informal gold mining sub-sector in Mongolia. By Mongolian Business Development Agency for Canada fund Mongolia (2003)

amalgamation is carried out on the spot, but many small-scale miners carry their gold ore to small enterprises in villages, which crush and grind the rock and often also carry out the amalgamation. Milling of the ore in the small enterprises is typically done on devices mainly produced in China (see Figure 1). During milling about one kilo of mercury is added per three to four tonne of ore. An estimated 30 percent of the added mercury is lost by the overflow water and deposited on the tailings (Figure 2). The lost mercury presumably contains appreciable amounts of gold, which is also lost. After milling the fine grained material is gravitated and the amalgam is heated in order to evaporate the mercury.

Retorts are used by a few of the village enterprises, whereas it is virtually never used by individual small-scale miners. Small-scale gold mining is an equal opportunity business. During the summer season about 50 percent of the small-scale miners are women and children. During winter the proportion of men increases. Amalgamation is mainly carried out by women and older children.

**Figure 1:** Milling of hard rock gold ore. About one kilogram of mercury is added per three to four tonnes of ore.



**Figure 2:** Tailing from milling of hard rock gold ore.



## Mercury

Small-scale mining for mercury takes place at Boroo River in northern Mongolia. More than half a century ago a Chinese mining company extracted gold from the Boroo river area. They used mercury, which was stored in a big tank. The company ceased its activities and left about 10 tonne of mercury in the tank. The mercury exploded and spread over an area of about one square kilometre on either side of the Boroo River. The mercury contents are so high so small-scale miners mine mercury from the river gravels. The mercury is gradually transported downstream the Boroo river and a severe contamination of the river water and sediments has spread more than 40 km down stream.

### Teaching and Training of Medical Doctors and Small-Scale Miners

During the World Bank survey in Mongolia a teaching and training course were held in Bornuur town north of Ulaan Baator. Since the course was focussed on how to avoid mercury pollution of the environment and population by amalgamation mainly women participated. In that particular area a Japanese survey of mercury content in the environment and the population was carried out in 2003.<sup>2</sup> The survey showed that the population of Bornuur town had high contents of mercury in their urine. The female small-scale miners were furthermore made aware of the fact that the foetuses of pregnant women upgrade the mercury contents of their mothers with a factor up to ten. These two facts were of course another reason for these female small-scale miners to be very keen on obtaining retorts and learning how to use them.

**Figure:** 3. Training small-scale miner using a retort for recycling of mercury.



Discussions with Ministry of Health in Mongolia furthermore unravelled that many of the local medical doctors have precious little knowledge of the symptoms of mercury poisoning. It has thus been decided by the Ministry of Health in Mongolia to apply to World Bank and other donor agencies for funding a project of teaching and training of medical doctors and small-scale miners in how to handle mercury in environmentally safe ways.

<sup>2</sup> Action research on mercury pollution in Boroo area Mongolia. Compiled by B. Tumenbayar for Japan International Cooperation Agency Mongolia Office (2003).