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## Asian Gold Miners Use Borax to Replace Toxic Mercury

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Each year tens of thousands of people are poisoned by toxic mercury spewed into the air, land and water by small-scale gold miners in Indonesia and other low income countries where production has soared as gold prices skyrocketed.

Now a U.S.-based NGO is working with a Danish government agency to substitute toxic mercury with safe borax -- a chemical used for centuries in soap and other products.

Some 600 tons of mercury are released each year in Indonesia alone -- more than the total mercury contamination in Japan's [Minamata Bay outbreak](#) in the 1950s which left 1,700 dead and thousands more with neurological damage from mercury wastes.

These days, small-scale miners mix mercury with gold-laced ore to create an amalgam of gold and mercury. Further heating drives the [mercury off as a vapor](#), wafting across downwind villages and falling into rivers during rains.

Mercury is concentrated in the flesh of fish which is then eaten by millions of people, including American and European consumers.

The precious gold remains behind. But so does damage to miners and hundreds of thousands of people living downwind of the processing operations.

"During amalgamation the metallic mercury evaporates [and] some of the vapour is inhaled by people working in the vicinity and may over time cause irreparable damage to their brains," according to Peter W.U. Appel and Jesper Bosse Jønsson, writing in a fact sheet for the [Geological Survey of Denmark and Greenland \(GEUS\)](#).

"The rest of the mercury vapour gradually precipitates on the ground and enters the drainage system, where it is transformed to methylated mercury by bacteria. Methylated mercury is water soluble and enters the food chain causing serious damage to humans who are at the top of the food chain.

"Methylated mercury is extremely harmful to the central nervous system, where it causes tremors, difficulty in walking, tunnel vision, psychological problems and eventually, death. There is no cure for permanent mercury poisoning."

Unborn babies are especially prone to damage. If a pregnant mother has mercury in her body, the foetus 'sucks' mercury from her. The nervous system of the foetus is much more sensitive to mercury than that of an adult.

Budi Susilorini, Indonesia country coordinator for the NGO Blacksmith Institute which is carrying out research on borax for mining, said in an interview that borax is a white powdery substance that is "very popular as a food additive."

Despite being forbidden by the government of Indonesia as a health hazard, food processors sometimes mix [borax into noodles, tofu, meatballs](#) and other foods to make them more rubbery or as a preservative.

Even gold miners who still use mercury to separate gold from ore use borax at the end of the process to make gold shiny, said Budi.

Borax reduces the melting point of metals and minerals allowing small-scale miners -- often called artisanal miners -- to extract and smelt their gold.

It may take between half an hour and an hour longer than the mercury method but borax does not harm the environment or people, it is cheaper than mercury and the gold produced is more pure, according to GEUS.

Blacksmith has worked to reduce mercury pollution in Indonesia by [helping miners capture mercury vapors](#) using a lid and pipe to direct them into recovery flasks.

But the use of borax to substitute for mercury marks a new step in cleaning up the increasingly industrial and polluted Third World.

According to Appel of GEUS, 15,000 miners in the Philippines have been using borax to separate gold from ore for 30 years. Now Blacksmith is bringing miners from the Philippines to train the Indonesian miners on the new technique.

"Borax can completely eliminate use of mercury," said Budi, "but it does not work in all kinds of ore."

"In Indonesia, for example we have hot spots -- we did two tests in central Kalimantan and it did not work because the gold is super fine. So we tried the method in another area in the same province and it worked."

Blacksmith recently conducted lab tests using samples of ores from many places and began to experiment on the borax method but they have not yet practiced the technique in the field.

"Our main objective is to eliminate mercury, especially in the amalgamation from gold processing, and we see borax can be a solution. We try to promote the borax method," said Budi.

The borax promotion team is aware that local miners in poor countries are principally concerned about earning enough money to feed their families and educate their children. Health is a bonus. So the team focuses on making the borax method cheaper and more productive than the mercury method.

"Changing habits takes time," said Budi, who noted that switching to borax can be done without switching any assets such as tools. The key is to bring miners from the neighboring Philippines who can easily relate to the Indonesian miners. The project is carried out with the Indonesian government's Ministry of Research and Technology and Ministry of Environment.

If artisanal gold miners around the world can be convinced to switch to borax, it would prevent the release of about 1,000 tons of toxic mercury a year, about 30 percent of [the world's mercury emissions](#), according to GEUS.

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