



Global Mercury Project

Project EG/GLO/01/G34: Removal of Barriers to Introduction of Cleaner Artisanal Gold Mining and Extraction Technologies



From the Editor

This issue highlights the strategy for implementation of the demonstration units as well as the situation of the artisanal miners in Lao PDR. The Project Coordination Unit (PCU) and the Governmental counterparts recognize that education is the key for effective measures in reducing mercury emissions in developing countries. Hands-on training will be provided to miners and other stakeholders. The training units proposed by GMP go after miners and not vice-versa. The rampant use of mercury as a result of the high gold price must be combated at the source. Therefore, free flow of mercury to developing countries must not be stimulated. The Hg-exporting countries should actively participate in all initiatives to bring means for poor miners to reduce their level of exposure to the toxic metal.

Implementation of Transportable Demonstration Units

Mercury emissions from artisanal and small-scale gold mining (ASGM) have been increasing substantially with the rising price of gold since 2003. Miners are coming back to re-work abandoned ore deposits or mining low-grade ores hitherto considered uneconomical. According to an estimate of PCU, 10 to 15 million people in about 40 countries might be presently involved in artisanal and small-scale gold mining. Amalgamation is an easy and inexpensive procedure to trap fine gold particles, but when misused it can lead to large mercury emissions. This poverty-driven activity may be responsible for as much as 800 tonnes/a of metallic mercury being released into the environment worldwide, representing more than 20% of the total anthropogenic mercury emissions. The most sustainable solution for this problem is **education**. Miners should know how to reduce exposure to Hg vapors and reduce Hg releases to the environment. As ASGM activities are of migratory nature and scattered over large areas, it is a challenge to offer training to these workers. The GMP team has been proposing Transportable Demonstration Units (TDUs) to reach miners in those regions where the aspect of migratory work is prominent. This reduces problems of land tenure and mineral rights that would be associated with a centrally-located, static demonstration plant.



Young gold panner in the Mekong River, Lao PDR

By using demonstration units, a variety of technical options for grinding, gold concentration, amalgamation and retorting can be demonstrated to miners and millers; it is up to them to select what is affordable, appropriate and durable according to availability of their funds and convenience. The units have high flexibility in terms of the subjects to be presented to the miners as well as the option to include "peripheral" education, e.g., health & sanitation, book-keeping, legal issues, etc. The TDUs will make use of tents or existing houses as classrooms and the training will be conducted either at the mine sites or at populated centers. The TDUs will also be placed to improve the public awareness about the impacts of mercury on the mining communities. The units bring flexibility to the training as they are easy to move from one place to another and introduce new pieces of equipment for demonstration without the need for concrete foundations, etc. The concept of TDUs has been discussed at stakeholder meetings in Zimbabwe and Tanzania with participation of Government, project counterparts, representatives of miners and equipment manufacturers. The concept has been very well accepted. The cost of these units ranges from US\$ 50-70,000.

The Global Mercury Project (GMP) began in August 2002. The GMP will demonstrate ways of overcoming barriers to the adoption of best practices and pollution prevention measures that limit the mercury (Hg) contamination of international waters from artisanal and small-scale gold mining (ASM). Six countries are participating in the GMP: Brazil, Lao PDR, Indonesia, Sudan, Tanzania and Zimbabwe. In addition, the GMP aims to introduce cleaner technologies, train miners, develop regulatory mechanisms and capacities within Government, conduct environmental and health assessments (E&HA) and build capacity in local laboratories to continue monitoring Hg pollution after the project.

First Global Task Force Meeting in Lao PDR, Dec. 17-19, 2003

The First Global Task Force Meeting was held in Luang Prabang, Lao PDR from 17-19 December 2003 with the participation of 31 experts from 11 countries. The meeting gathered members of the PCU, Country Focal Points and their Assistants (ACFP) from the 6 GMP participating countries as well as representatives from GEF/UNDP, USEPA, UNEP, and National Institute for Minamata Disease, Japan. The presentations from Brazil, Indonesia, Lao PDR, Sudan and Zimbabwe provided an overview on socio-demographic conditions, characteristics of the mining communities, description of the mining sites and mineral processing and amalgamation methods used by the artisanal gold miners. The talks revealed that as much as 30 tonnes of mercury have been annually released into the environment in the regions chosen by the Project to implement solutions to reduce Hg emissions. The Chief Technical Advisor (CTA), Mr. C. Beinhoff called the attention of the audience mentioning that upon inception of the Global Mercury Project, UNIDO had received numerous inquiries for initiating similar programmes and activities in other developing countries, such as Venezuela, Cameroon, Ghana, Mali, Mozambique, Philippines, etc. He reminded that further support to the project through donor governments and aid agencies will not only depend on their good will, but also on the quality of project implementation, the reliability of data, and the replicability of the entire strategy. Reducing mercury emissions and eliminating the undesirable health and environmental effects will require a delicate balance of technical assistance and of progressing enforcement of regulations. In this context, the PCU is counting on a strong and continued commitment of the six Governments over the remaining time of implementation and beyond that period. Regarding the use of mercury, participating countries should try to make the market and trades more transparent.

Analytical Equipment for Hg



LUMEX allows accurate Hg analyses in the field

The PCU has selected LUMEX RA 915+, a CVAA spectrometer, to complement existing analytical equipment of selected laboratories in the 6 GMP countries. This instrument was devised for air analysis, but it is also suitable for analyzing Hg up to 0.5ppt (ng/L) in solution. Another kit, a

pyrolysis chamber, promotes thermal decomposition of samples allowing analysis of liquids and solids (fish, hair, sediments). In a recent mission to Venezuela, UNIDO team analyzed 300 urine samples in less than 12 hours. The equipment can use the alternator of a car as a source of power. GMP will conduct a training course for technicians from all participating countries.

Mercury Conference in Slovenia

The 7th International Conference on Mercury as a Global Pollutant will take place in Ljubljana, Slovenia from June 27 to July 2, 2004. The Conference will feature 650 presentations and is expected to bring together almost 1000 experts from over 50 countries. The International Conference Series on Mercury as a Global Pollutant (ICMGP) was initiated in 1990 in Sweden. The Conference will be held in a country that had the second largest Hg mine in the world. The Hg mine which was located at Idrija was operational for over 500 years up until 20 years ago. The increasing problem of Hg pollution from artisanal gold mining in developing countries encouraged the Conference organizers to establish many oral and poster presentations and a round table on the theme. The GMP will be represented by the PCU, ACFP from Tanzania and Zimbabwe and GMP-invited participants. PCU will present 15 papers reporting on the initial results of the Environmental and Health Assessments in the GMP countries.

Training Modules Being Prepared

Presently, PCU is cooperating with the small-scale mining expert, Mr. Edmund Bugnosen, in developing training modules to be used for operating the TDUs. The training material will be divided in modules where subjects related to gold processing will be produced for different levels, depending on the education of the reader. It is expected to train miners, millers, inspectors, Government representatives and members of the mining community. The training modules will serve as a basis for hands-on teaching on the benefits of each piece of equipment. The modules will cover the following topics:

- Knowing Hg and the problem (e.g. Hg sources, characteristics, cycles, pathways, symptoms of Hg poisoning, impacts, etc.)
- Understanding the source of Hg pollution (e.g. bad and good amalgamation practices, Hg evaporation, amalgamation tailings, improper handling, etc.)
- Solutions: reducing or eliminating Hg (e.g. legal means, social approach, technological approach, cleaner techniques, recycling, etc.)



Bare-handed miner in Zimbabwe exposing himself to cyanide and mercury

The training modules will be supported with videos, slides, posters, brochures, etc.

E&HA Started in Lao PDR

In February, the renowned French Institution, BRGM started the Environmental and Health Assessment (E&HA) in the Mekong River Basin in Lao PDR. The project area is approximately 25 km away from the town of Luang Prabang where Mekong and Nam Ou are the major and vital rivers used by the community of 8 villages (3850 people). Most people are rice farmers and seasonal gold miners, i.e. panning for gold in the dry season. The access to the area is either by gravel road or boat. Artisanal gold mining started in the mid 1970s and typically involves manual excavation, which is usually conducted by men, and panning of the riverbed material and amalgamation of the heavy concentrate, which is usually a work for women and kids. With no sophisticated equipment, this is a family affair that usually produces 10 to 40 grams of gold per annum per household (627 households in the project area). In Lao PDR, one kg of Hg costs US\$ 75 to 87.6 which is very expensive compared with the international price of US\$ 5/kg. The high cost of Hg is supposedly an incentive for its recovery and re-use, but it is estimated that only half of those households burning amalgam make an attempt of recovering the vaporized mercury. In fact, amalgam is burned in bonfires in houses or outside in the presence of kids. The total mercury release from the Project area represents 5 to 6 kg/a. In order to recycle mercury from the amalgam, a few villagers use a unique technique. They put the amalgam in a metallic glazed plate with a bamboo tube in the vertical position around the amalgam. When the bowl with amalgam is burned with wood, mercury evaporates and condenses on walls in the interior of the bamboo tube. The gold remains in the bowl. The condensed mercury is removed with a chicken feather to be re-used. Very soon the BRGM team will reveal the main findings of their study.

Meeting of African GMP Countries

From February 1 to 5, the PCU met with the Sudanese, Tanzanian and Zimbabwean project representatives in Zimbabwe to discuss the implementation strategy in Africa. The visit of the Sudanese and Tanzanian representatives to the artisanal mining processing centers in Kadoma, Zimbabwe, was very fruitful to highlight points for discussions on the advantages and drawbacks of the different types of equipment being used by the Zimbabwean miners for gold processing. Other Government representatives were in Kadoma when the PCU made a presentation of the concept of the Transportable Demonstration Units. After reviewing the document detailing all aspects of the initiative, the stakeholder gave their approval to the PCU to start the implementation process in Zimbabwe. The other two members of the African countries also welcomed the idea. A visit to a local equipment manufacturer has demonstrated the viability of implementing such idea in short term.



Female miner in Lao PDR using mercury to amalgamate concentrate from panning

Cooperation with International Institutions

PCU has thankfully accepted the invitation of the National Institute for Minamata Disease in Japan (NIMD) for discussing cooperation with the GMP on field level. NIMD envisions conducting a medical follow-up of Hg-intoxicated miners. The Institute has offered *inter alia* to analyze methylmercury in hundreds of hair samples. The US EPA is also collaborating with the GMP in the preparation of a workshop for laboratory technicians from the 6 GMP countries. The course will encompass training in using LUMEX and other techniques to analyze Hg in different samples.

Website with a Discussion Forum

The GMP website is on-line: www.globalmercury.org. A Forum for discussions on Hg related subjects was created at: www.globalmercuryforum.org. The Forum has lots of interesting features, like associated mailing list (allowing to upload attached documents), news group or chat, links with other Hg websites, documents, etc. The user may register by filling in the form in the member section. Then he/she will be able to enter the Forum using their own username and password and have their own identity when posting messages. The Forum has 2 conference rooms: one related to the GMP and another with a more general discussion forum about issues related to mercury pollution.

Workshops on EU Level in Brussels

In preparation of international agreements on Hg, the Nordic Council of Ministers and the European Commission had organized two workshops in Brussels held from March 29-31, 2004. PCU reported on the progress of GMP and revealed the striking information on mercury use in small-scale gold mining. PCU demanded the end of export of almost 800 tonnes/a of mercury from the European Union.

Activities Dec. 2003 – Mar. 2004

- ✓ First Global Task Force Meeting in Lao PDR, Dec. 17-19, 2003
- ✓ Elaboration of the Equipment Specification documents for Zimbabwe and Tanzania
- ✓ Meeting with GMP representatives from Sudan, Tanzania and Zimbabwe to discuss implementation strategies, equipment specifications and operation of the Transportable Demonstration Unit (TDUs)
- ✓ Meeting with equipment manufacturers in Zimbabwe and Tanzania to discuss terms of reference of equipment.
- ✓ Meeting with potential operators of the TDUs in Zimbabwe and Tanzania
- ✓ Initiation of equipment acquisition for TDUs.
- ✓ Final editing (for printing) of the Protocol with methodologies for environmental and health assessment of Hg in artisanal and small-scale mining areas
- ✓ Selection and acquisition of LUMEX atomic absorption spectrometer to be delivered to all 6 GMP participating countries.
- ✓ Cooperation with mining expert in elaboration of training modules
- ✓ Conducting Environmental and Health Assessment in Tanzania and Lao PDR
- ✓ Supervising E&HA in Lao PDR
- ✓ Presenting the GMP at the EU level Workshops on Mercury, Trends and Needs for International Agreements, in Brussels March 29-31, 2004
- ✓ Participation in the Steering Committee meetings in preparation of the 7th Int. Conf. of Mercury as a Global Pollutant, Slovenia, Feb 2004
- ✓ Elaboration of 16 papers related to GMP to be presented at the 7th ICMGP
- ✓ Preparation of Country Force Task Meeting in Brazil, April 2004
- ✓ Consultations of Indonesia ACFP with Indonesian equipment suppliers
- ✓ Preliminary discussion on production of brochures and other public information to be part of the project awareness campaign

Plans for Apr. – Sept. 2004

- Health Assessment in Zimbabwe and Sudan
- Environmental Assessment in Sudan
- Evaluation of miners' needs and potential equipment manufacturers or agents in Sudan, Brazil, Lao PDR and Indonesia
- Preparation of equipment specifications for Brazil, Sudan, Indonesia and Lao PDR
- Meeting with Government representatives and other stakeholders in Tanzania to discuss the results of E&HA
- Stakeholder meeting in Brazil to disclose and discuss the results of the E&HA
- Continuation of elaboration of the Training modules
- Start of elaboration of activities for the public awareness campaign in all participating countries
- Participation in the 7th ICMGP, Ljubljana Jun 27-Jul 2, 04
- Discussion with National Institute for Minamata Disease on collaboration strategies and follow-up on intoxicated people identified in E&HA
- Input and follow-up of the Nordic Council of Ministers and European Commission Workshops on Mercury
- Training of technicians from all 6 GMP countries on LUMEX CVAA spectrometry
- Cooperation with the Institute for Atmospheric Pollution of the Italian National Research Council on Source-Receptor Impacts of Hg on Human Health
- Presentation of the GMP and preliminary project results at UNEP Stakeholder Meeting on Mercury in Thailand
- Advisory services on improvement of legal framework
- Recruitment of expert on micro-financing systems for ASM in Tanzania



Gold miner checking the content of Hg in exhaled air.

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