Global Mercury Project

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

Information on Project Sites in Brazil

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1. Introduction

This document consists of a description of the Brazilian selected hotspots gold producing sites, i.e., Creporizinho and São Chico, at Itaituba Municipality, State of Pará, Brasil, their extraction and processing characteristics and the environmental and health impacts, so far detected .

Furthermore, the basis of this document were the reports on the Sociological Aspects, by Armin Mathis, Extracting and Processing Aspects, by Alberto Rogerio da Silva, Field Report on the Tapajos Visits by Christian Beinhoff, Mercury in the Tapajos Basin book, edited by Roberto C. Villas Bôas, Christian Beinhoff and Alberto Rogerio da Silva, and the Preliminary Field Campaign Aspects on Environment and Health, coordinated by Saulo Rodrigues Pereira Filho.

2. Description of the Sites

2.1. Geographic Information

The Rio Tapajós Basin area is the main Brazilian gold *garimpo* (artisanal mining site) location with an official area of 28,000 km^2, for such an activity; however its real area is of the order of 100,000 km^2. Just for the sake of comparisons: Portugal has 92,000 km^2;Switzerland and Nederland, together, 75,000 km^2 .

The selected areas of Creporizinho (06 3017´´´S and 56 35´06´´W) and São Chico (06 25´31´´S and 56 02´99´´W), are located in the Rio Tapajós River basin , situated in the SW of the State of Para, Brazil, distant 1,300 km from Santa Maria de Belém do Grão Pará , better known as Belém , State Capital.

2.2. History of Mining Activities

In the Amazon Region, *garimpo* occupies an area of 236,000 km^2 , corresponding to 4.34 % the total area. In the Sate of Pará alone, the area reaches 150,000 km^2 being Tapajós the largest *garimpo* area in the world – 100,000 km^2 – and the most important artisanal gold mining producing region in Brazil .

Garimpo in the Tapajos area started back in 1958, the historical production of about 10 to 12 tonnes per annum, being the world largest gold producing area with nearly 500 airfields. Gold has been extracted from both secondary and, nowadays, primary ore deposits. More than 2,200 mining sites have been detected. About 500 occurrences of primary gold deposits were reported of which approximately 100 deposits have been mined by ASM.

Tapajós historical official gold production is of 180.6 tonnes (Table 1), which is equivalent to US$1,915 million. Nonetheless, the estimated real production is around 650 tonnes of gold (US$ 6,877 million). Between 1993 and 2002, it represented 36% of the total State of Para gold production, three times more than the Cumaru-Redenção-Tucumã Region and ten times more than any other gold production area. It is important to highlight that the current gold production of the Pará State is very much influenced by Igarapé Bahia gold mine, located in the Carajás mineral province, and operated by the Companhia Vale do Rio Doce – CVRD- producing around 10 tons per annum.

Table 1 – Tapajós historical official gold production

Period	Volume (tonnes)	Value (US$ million)

1958-60	2.4	2.4
1961-70	6.2	19.2
1971-80	13.1	110.3
1981-90	86.4	1085.6
1991-00	67.5	692.30
2001-02	5.0	50.00

2.3. Community Characteristics

In this section only those community characteristics that are of interest to the project goals will be briefly described.

2.3.1.- Creporizinho

Creporizinho might be considered to be a typical gold mining village of the region backed by some degree of civil infrastructure; three churches , one catholic and two protestants , a large variety of grocery stores ,and specialized stores for clothes and shoes , a police station with one responsible officer, one corporal and one soldier. Also, some 238 houses for an estimated population of 1000 inhabitants, besides a grocery, a pharmacy and a lodge. Electricity is generated from diesel engines. The existing 200 children go to the local elementary school, from 1st to 6th grade, where 4 teachers, a caretaker and a cook perform their educational duties. There are four gold buyers at the village , no dust or gaseous collecting hoods at these buyers are available .

Five oil retailers, selling around 100,000 liters of fuel oil monthly, provide the necessary fuel for the gold diggers. This represents around 90% of the power source in the area.

Health care is provided by a public health post, which carries out malaria tests and provides medicine in case of malaria fever; also a health agent at the village, who is paid by the local authority. People can apply for an appointment with a MD, who flies in, if enough patients ask for at a check-up cost of R$35, approximately US$ 12.5 at November 2003 exchange rate. The area is malaria infested and therefore child mortality is high. Other infectious diseases with high prevalence are Dengue and venereal diseases. Occupational exposure to mercury is recognized as a health risk as well.

Such mine town , locally called *currutela* was founded in 1962 , and accessible only by boat first , then air, in 1974 and latter on , in 1986 , with the construction of the *Transgarimpeira* Road , by land. July is the driest month with an average rain precipitation of 24 mm and the raining season runs from January to March reaching some 340 mm per year , and average temperatures of the order of 26 °C , although daily variations of the order of 10 °C.

Its top gold production was between 1983 and 1990 , where productions of the order of 350 to 400 kg of gold per month were recorded . At that time 10.000 inhabitants were living there and the town had 3000 registered voters.

Today**, Creporizinho** is used as a logistical base to work fronts located within a 10 km radius; according to Mathis around 60 pairs of machines and 15 shafts are active in the region , thus indicating a population circa 350 people directly working in these sites , 300 gold diggers and 50 cooks , with a **estimated monthly production varying from 15 to 50 kg of gold**.

The *garimpo* area can be reached from **Creporizinho** ,with a four-wheel drive car, in one hour. In this region, **Mr. Tolentino**´s site (S 06 47´51.4´´ and W 56 36´13.8´´) is worth mentioning for the

objectives of the Global Mercury Project (EG/GLO/01/034). The gold bearing quartz veins (*filão*) are in close vicinity to the processing and extraction sites.

2.3.2.- São Chico (also recently known as Fluminense)

Discovered in 1963, **São Chico** is passing through the initial stages of a transition from *currutela*, local name for a settlement erected out of a *garimpo*, to a village; from 1986 onwards, with the opening up of the *Transgarimpeira* road , the accessibility of the place, previously reached only by small airplanes, lowered significantly the costs of production and maintained the feasibility of exploitation even during the economic crisis of the 90´s.

The site reached its top production during 1999 to 2201 when production of circa 2 tons of gold was reported and the population peaked about 5000 people .Two years after that rush, **São Chico** shows little activity, with an estimated **gold production of 1 kg per month,** slightly higher in summer months.

São Chico is just 2 km away from a local airstrip and 5 km distant from a gravel road that during the dry season (June-September) is used for transportation of materials, equipment and supply from **Itaituba**, the already mentioned main town of region with 150,000 inhabitants, 350 km distant from São Chico. This distance is covered by 30 hours of driving.

In contrast to **Creporizinho**, **São Chico** consists only of 63 houses along the old landing track and 4 out of these destined to public use, 3 are for commercial uses, eight abandoned and a total of 49 inhabited for a registered population of 134 individuals. The only public service is a health post for malaria and the police station has been abandoned for 3 years; there are 3 diesel retailing stations , four gold buyers and the village elementary school installed in January 2003 , interrupted its activities in June 2003. There is just one public telephone. As stated by Mathis "There are no forms of civil organization in the village. The only form of organization is through the protestant church "Assembléia de Deus" gathering 30 people.

As for raining averages, July is the driest month , average precipitation of 10 mm , and January to March the raining season with average precipitation of the order of 290 mm per annum .As for the temperatures, the same as reported for **Creporizinho**.

At this location **Montanha** site (S 06 25´04.4´´ and W 5558´07.5´´) is worth mentioning for the objectives of EG/GLO/01/034 Project.

3. Mining Extraction and Processing Characteristics

3.1. Number of Miners in the Country and on the Project Site

We shall focus this subsection on the number of *garimpeiros* (artisanal miners) that are only working in gold extraction. Miners from formal mining company or *garimpeiros* who extract other type of mineral substance, such as gemstones, were not considered herein.

The number of gold *garimpeiros* do vary according to the actual price of gold at the international metals market and prices of diesel oil at the extraction sites. In Brazil, it is estimated that between 200 to 300 thousands gold *garimpeiros* are in activity and about 30% is located in the Tapajos region. For the project sites, these numbers were already mentioned above.

3.2. Categories of Miners on the Sites

Here again, reference is made to the categories of *garimpeiros* on the sites .

At both areas, everything runs depending upon gold extraction; the *garimpeiros*, oil dealers, gold buying shops, commerce, agricultural activities, etc.

Men are the working force in ore extraction, while women are involved in cooking at the *garimpo* sites; there is no evidence of child labor.

3.3. Gold Production Methods

The area of Tapajos is subjected to *garimpo* since 1958, and due to the overall historical and legal background earlier described, an evolution from earlier manual exploitation methods to mechanized machinery methods, is herein presented.

Nowadays, due to the reprocessing of old tailings and processing of primary ores, cyanide (mal) practices are in effect in the region - the dangers of it , not only to living organisms , men included, and to tropical compartments has to be ever emphasized.

3.3.1. Manual Method

The manual method is an ancient and most traditional way to recovered gold since this metal has been of interest to human beings. It consists in using of simple and rudimentary equipment. Normally the area to be exploited is alluvial flat or outcrops and laterites, the art of recovery following some simple rules: after removing the mineralized bearing material, gold is recovered in a rocker or sluice box (*cobra-fumando*, as called in *garimpos*). The rockers or sluices are lined with carpets, corduroys and other fiber materials as used in the earlier days of the Californian Gold Rush. This improves recovery on fine gold. For separation of the amalgam, a piece of cloth is used, twisted enough to squeeze off excess mercury leaving behind the amalgam. Once the amalgam is thus obtained, it is burned in open air using a blowtorch.

3.3.2. Mechanized Machinery Methods

A brief description of the mechanized methods , in the sense that they utilizes heavy machinery and energy , follows and they only vary in the way dismantle the ore body is dismantled and transported to the concentrate, being the recovery of gold about the same .

3.3.2.1.- Dredge or Raft Method

These ancient methods, although using modern and more powerful machinery - the difference between dredge and raft being the underwater operation of the later, where a diver manually directs the suction of the material to be brought to the concentration equipment, utilize hydraulic controlled suction pumps to recover the ore bearing masses, were introduced for recover mineralized level or gravel at the active alluvial sediments in the main drainage of the Tapajós River Basin.

Typically a dredge or raft is mounted on two wood boats or two iron tubes, having circa six meters in length each, hanging the diesel motors (from 40 to 65 HP) on boards. It is covered with nylon protection and move along the river drainage engineered by 15 HP Yamaha boat motors. The larger horsepowered engines move a centrifugal pump mounted on to two hoses with diameter from 4 to 6 inches. In one of the hoses, whose extremity is inside water, a scrapper , locally known as *abacaxi* (pine apple), denomination to define metallic cylinder utilized to provide suction of gravel or mineralized level. Such *abacaxi* makes suction of the gravel or mineralized level from the riverbed. The pumped slurry is brought at the surface and pass through a screen which removes the cobbles and coarse gravel and dumped the fine fraction into a sluice box lined with carpet and with riffles to concentrate coarse gold particles.

To the final concentrate is obtained after washing the carpet. At this point, mercury is added into the sluice boxes, and the material is collected in a amalgamation drum, where additional mercury is added. The excess Hg is filtered in the same way that was described above and amalgam is burned with a blowtorch in a bowl.

3.3.2.2.- "Chupadeira" or "Par de Máquina" Method

The *chupadeira* or *par de máquina* , the local names for hydraulic monitors, are used to erode the alluvial and colluvial ore. The work follows a sequence: firstly the vegetation is cleared., secondly the *barranco* (the geological material) is destroyed with two water jets. A high pressure water jet cuts and wash the *barranco*. The hoses usually have 2 to 3 inches of diameter. A second hose provides water to adjust the dilution of the pulp. A pump sends such a pulp to the upper box with a screen where the finer material goes to a riffled sluice box lined with carpet covered retains gold. The same aforementioned procedures to produce gold are followed.

3.3.2.3.- Hammer Mill Method

The hammer mill method started up in Tapajós, following the discovery of primary gold in quartz vein. Firstly the material is excavated and the ore transported to the hammer mill. The mill then grinds the ore and after grinding the pulp is then transferred to the sluice box and the remaining steps are those aforementioned for the previous methods.

In all methods so far mentioned the produced tailing are throw into river drainage or pits close to gold extraction operation , thus producing an enormous volume of discarded material which unemployed or others nearby try to get the remaining gold; locally it is called *reque* or *reco* (little ore material volume with lower gold content that unemployed *garimpeiro*, local name for those who labor at *garimpo*, works out).

3.3.2.4. Cyanide

Again, reference is made to cyanide processing normally encountered at the *garimpo* sites; no mention will be made to the industrial cyanide processing which is normally conducted by the mining companies for gold recovery. This latter has been subject of great improvements in the processing itself and handling, this being done under the **UNEP´s Cyanide Mining Code** .

At the sites , though ,cyanide may be added to a 20 to 30 % solids pulp, or even more, made up of old tailings and or primary ore concentrates and tank stirred thus dissolving gold in a cycle of 10 to 12 hours , adjusted accordingly; solids are separated from the liquid and the liquid is subjected to zinc powder or activated charcoal , both having the ability of promoting Au precipitation ; also, what is more common , cyanide is brought into contact to the mass where gold is to be extracted , in a saturated solution and left out for some days , the overflowing liquid being washed out and recovered the way aforementioned .

During the visits the sites, no cyanide operation was under play and no real field data could be thus collected.

3.3.2.5 Garimpos Sites

At Creporizinho the following *garimpos* were visited , in order to determine the one to conduct the environmental and health surveys ; they do not include all the working fronts , but rather were selected on the basis of their extractive diversity , i.e., secondary and primary deposits , plus tailings reprocessing ; an active *garimpo* site and within AMOT concerns as well:

1.- ZÉ BAIANO (S06 47´50.0´´W56 38´56.9´´) ; inactive .

2.- TOLENTINO (S06 47´51.4´´W56 36´13.8´´) : a slope , 3 shafts , a *par de máquina* **;** at present the plant process 700 metric tons of gold bearing ore per day , with 4 teams, operating in two 12 h a day shift, coming from the primary shafts (3 teams) and the *par de máquina* (1 team) and it is said to content 0.8g per metric ton as head ore , producing a gold grade of 77.5%.
3.- STA. THERESINHA (S06 46´57.5´´W56 39´58.2´´) : a shaft , 8 people team and cook , extracting primary gold , the team receiving 18% of gold production and the cook perceives 5g Au per month from each of the 8 men .
4.- LUIZINHO (S06 47´08.9´´W56 40´04´´): 3 people team ,earning 30% of the production, reprocessing tailings .
5.- TAFAREL (S06 47´09.4´´W56 40´14.5´´) : 5 people team , 2 shafts (20 m and 13 m deep), primary gold, producing 500g of gold.
6.- NEGÃO (S0645´23.3´´W56 40´58.9´´) : at the time of the visit was inactive (lack of personnel) , 1 *par de máquina* **,** 40 to 60 g production within 5 to 6 days cycle , when active.
7.- CODÓ (S06 45´44.7´´W56 40´47.5´´) : 6 people , two *par de máquina* in banks of 20m x 20m, producing circa 150 g in cycles of 15 to 20 days .
8.- ZÉ DO BAIXÃO (S06 46´44.7´´W56 40´47,5´´) : 6 people , 1 *par de máquina*, exploiting the same CODÓ area with about the same output .

Five other similar areas are listed at Mathis´ Report of the same characteristics .

At São Chico, the following :

1.- MONTANHA (S06 25´04.4´´W55 58´07.5´´) : 3 hammer mills with 10 people and 3 *par de maquina* , with 9 people ; cyanide processing was conducted at this site ; gold purity of 58% in both primary and secondary material.
2.- ROSA (S06 25´38.0´´W55 57´16.9``) : 12 people and 4 *par de maquina* **.**
3.- SÃO CONRADO (S0625´04.4´´W55 54´45.3´´) : 6 people , 2 *par de maquina* .
4.- SURUCUCU (S0626´17.3W55 55´28.5´´) : 15 people and 5 *par de maquina*, producing circa 210 to 240 g per cycles of 8 to 10 days , with na informed gold purity of 80%.

Two other sites are reported at the aforementioned Sociological Report .

3.3. Use of Mercury

Mercury, sold at R$ 80 a kilogram, about US$ 28 per kg, does not represent a major cost for the *garimpeiros* . Therefore there is a tendency to not handle it with care or caution.

At the chosen sites of **TOLENTINO** and **MONTANHA** gold production is almost the same , of the order of 1 kg per month , although the installed capacities for processing gold bearing material are quite different . At **TOLENTINO** there is 8 times more volume of processed material than **MONTANHA** and tailings constitutes near 97% of the total processed for both . It is estimated that an average gold content of 3 g/t and 0.4 g/t is available at **MONTANHA** and **TOLENTINO** respectively, and that the average ratios of Hg to Au are of the order of 1.5 to 1 at **TOLENTINO**´s and 3 to 1 at **MONTANHA** , having the following estimated partition 0.5 kg per month of mercury goes to the drainage directly and 1 kg per month of mercury to the air , and 2 kg per month of mercury to the drainage and 1 kg per month of mercury to the air , for **TOLENTINO** and **MONTANHA** respectively . An educated guess (Rodrigues Filho & Santos , 2003) is that for the whole area of **Creporizinho,** a multiplying factor of 10 might be applied to **TOLENTINO**´s emissions .At **TOLENTINO**´s past cyanide practice was detected adding to the mobility of mercury , and other heavy metals , a very good " accelerator " to spreading out and disperse such metals into biota.

4. Environmental and Health Impacts

Garimpo, per se, alters the environment and occupational health of its affected surroundings and people due to TWO major problems: release of mercury into biota and atmosphere AND promoting silting out of the river basins and streams , not to mention the "moon landscape" aspects of the extracting , and surroundings , sites and some deforestation – in order to set up the *currutela* and extracting sites.

As for mercury, some systematic field campaign that CETEM and collaborators carried out from 1989 to 1993 in the Pantanal Region and some SW Amazon areas of Brazil , detected that in almost all *garimpo* tailings mercury is presented as metallic mercury, and its distribution in the tailings is a function of the location of the *garimpos* workings. As expected, higher concentrations were found at the tailing ponds where amalgamation is practiced. Mercury present in gold extraction areas might represent an important source of contamination for centuries after the closing of extraction activities. The Carson River Superfund, in Nevada, is a good example.

As for the particulate matter, in the Amazon region, physical and physico-chemical impacts on the environment and local health deriving from extraction activities are present, as dusts coming from mining activities for bauxite, iron ore, manganese and sediments and tailings from gold and tin *garimpo***,** as erosion and increase of suspended load, changes in color, turbidity and water properties; silting out , alterations in river courses or even disappearance of such rivers; the ever present soaps and oils used in the extraction methods. All these cause damaging of life organisms, damaging of fishery, increasing water treatment costs, endemic diseases, etc.

Worth mentioning that the *currutelas* were formed without any previous planning, immediately impacting the region, normally an envious region before, causing a tremendous population increase and a chaotic societal life, having no sanitation or public health available, and, as an expected pattern, no environmental or major health concerns regarding the effects of the activity they are thus dedicated .

As time goes by, evidently, as usual, the *currutelas* transform into villages, these into towns and some as real cities, and social transformations do occur, as it is the normal pattern.

4.1. Visible Visual Impacts

Higher visual impacts are seeing in **TOLENTINO** than in **MONTANHA** , due to the multiplier of 8 in masses of discarded material directly to "dams" that are within the drainage system.

However, both offer impacts, besides those proper of the living conditions in the areas.

The normal erosion, scattered holes, abandoned pounds, silted river beds , local deforestation are always present and open air burning of amalgam.

As for silting out and other visual impacts, the effects of *garimpo* can be observed some 300-500 km down stream, in the Tapajós River, up to the city of **Santarém** .

4.2. Visible Health Impacts

No visual health impacts on the living population ,derived from mercury contamination and silting out of rivers, are seen at both sites just looking the faces of people !

Nevertheless, such areas are endemic in malária , dengue fever, and malnutrition , not properly brought about by gold extraction .

The most salient aspects of visual health impact are the open air burning out of amalgam , largely practiced and normally conducted near by or at the camp kitchen, the presence of domestic animals, as chickens, pigs, dogs, cats, etc. throughout the exposed area and the uncontrolled spill of mercury and particulate matter to local river drainage, which might result in fish toxicity reverting back to the nearby or faraway population .

4.3. Main Problems and Bottlenecks to Introduce Cleaner Technologies

4.3.1 Declared Bottlenecks

The project NEWSLETTER is been widely accepted and requested ; however , to the local stakeholders , mainly at the *garimpo* sites , English is not known , and several of them asked to have a NEWSLETTER in native language (this occurred in Brazil and Indonesia).For the remaining of the forecasted phases of the project , where it is very necessary to bring awareness and preparedness of locals into play , suggestions that the NEWSLETTER should be available in native language as well have to be considered .

Another quite present comment is that the several PHASES through which the project go are not very clear to local stakeholders, since international bidding for each phase has not be seen at the region. However, such misunderstanding relies much more on the fact that this way of project conduction and management are new to locals , thus arising such lack of complete understanding of the way the project is contracted and results obtained for the next phase . Nevertheless , care should be taken on this issue and explanations be given whenever necessary and for many times it is necessary .

4.3.2. Main Problems

Introduction of cleaner technologies or any new technology that is not mastered locally requires the design of well conducted educational and training campaigns to be successful. In this respect, it is then advisable that methodologies such as Train-X or any other to be utilized for that matter will require careful planning and analysis before adopted . In this regard not only the **garimpeiros** are to be trained , but also, local municipal authorities and local people in a preparedness and awareness campaign fashion.

Other aspects of the eventual problems that might arise are concerned with the demonstration or pilot plant phase, where an unit will be mounted and operated , at the sites, proving that the introduction of newer methods or equipment will help in minimization of environmental and health impacts , with accelerated profit gains . The forecasted problems , for which the PCU has to develop some insights together with the CFP and ACFP are related to the property of plant equipment , its maintenance , who bears the operational costs of the plant once the project running time is out and how to monitor the results of the applied technology , through time, at the sites.

4.4.How Stakeholders Are Seeing the Global Mercury Project

As for the stakeholders the following actions were taken and the results so far reached :

4.4.1 Stakeholders Meetings :

Belém 2001 pre CTFM ,
having a participation of 63 people from garimpo , 13, NGO´s, 16, Federal Agencies, 10, State Agencies, 12, Press 4, Municipal Agencies 08 , held at the State of Pará Secretary of Environment and Science and Technology ; from this meeting the “Mercury in the Tapajos Basin ” book was edited and printed and 1000 copies distributed all over the world .

Itaituba 2001 pre CTFM,
having the presence of Christian Beinhoff , UNIDO, Saulo Rodrigues Filho and Zuleica Castilhos, CETEM and the Municipal Secretary of Environment and President of AMOT , Dirceu Cunha and Mining Expert Alberto Rogerio da Silva , where the objectives and goals of the project to be were discussed with community leaders and local stakeholders .
Belem 2002 CTFM ,
again having circa 70 participants and presided over by the State of Pará Secretary of Environment and Science & technology , Gabriel Guerreiro , where the revised set of goals and implementation procedures after the signing of the country agreement were analysed .
Itaituba 2002 CTFM ,
With 56 AMOT associates **garimpeiros** attendants , municipal authorities and presided over by the same State of Pará Secretary of Environment Science & Technology, where the stakeholder meeting was thus continued to the local audience and Itaituba mayor.

4.4.2. Stakeholders Continuous Information

A series of, already eight e-mails message bulletins has been regularly distributed to all participants of the aforementioned meetings and newcomers, announcing the events and results of the bids under way. This was found a very consistent way of maintaining stakeholders active in participating and commenting and return commentaries of circa 20% of the stakeholders is an average for each bulletin so far published.

4.4.3. Press

Press is been very active in promoting the project, both the local press (radio interviews, television, and newspaper) and Radiobras, at federal level, where several articles were produced throughout these last months.

5. Conclusion

5.1. Analytical Results and Data Bank ;

From the field campaign results, so far reached ,a better understanding of the environmental and health problems of sites is available and will be of utmost help in the phases to come; besides da Silva´s Report brings a complete , the most complete and comprehensive, by the way, data bank ever on mercury affecting the Brazilian amazon region showing 29 files, of 6.219 mercury samples, including 32 organic mercury samples ,all collect from 1989 to 1998, regarding the Tapajós River Basin, at the locations of Aveiro, Barreiras, Brasília Legal, Itaituba, Jacareacanga, Saicinza, Santana do Ituqui and Sao Luiz do Tapajós.

5.2. As for the Absence of Retorts and Use of More Efficient Equipment

Open air amalgam burning can be solved simply by using a retort. However, nobody utilizes them. ***Retorts*** are known and used to burn the amalgam and recover mercury since **Agricola**´s time, or even before; notwithstanding, it is quite seldom utilized by *garimpeiros* or small scale plant operators, throughout the world, on the basis that they are cumbersome to operate, decreases gold recovery and produces a “burned ” or “dark ” gold . Thus, amalgams continue to be burned open air damaging the health of the burner himself and releasing mercury and oxidized mercury to the surrounding air, promoting all kinds of the effects aforementioned presented. Is this a matter of legislation? enforcement of law? education of the *garimpeiros*? lack of proper equipment? Or what? In fact it is a mixing of all these, but mostly , due to the “farwestern” living conditions normally found in these areas , but not always, just lack of real understanding of the mercury effects on their own health and consequences, since retorts are cheap, or may be so, readily manufactured, or may be so , easily operated , or may be so, and really avoid intoxication by the one who is burning the

amalgam. Also, important to note , many of those that claim retorts do not work, just submerge the end of the mercury condenser pipe in the water bucket, when using it.

The solution? From my viewpoint, EDUCATIONAL and TRAINING campaigns showing the damaging effects of mercury to the health of their children and family; worth mentioning the projection, *in extremis*, of the Minamata movies.