

Luang Prabang Artisanal Gold Mining and Sociological Survey, Lao PDR

Final Report for UNIDO
“Removal of Barriers to the Introduction of Cleaner
Artisanal Gold Mining and Extraction Technologies”



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Executive Summary

Earth Systems Lao was engaged by the United Nations Industrial Development Organisation (UNIDO) to conduct a baseline sociological survey in Chomphet and Pak-Ou districts within Luang Prabang Province, Lao PDR where artisanal (or small-scale) gold mining is undertaken. A particular focus of the survey was the collection of information about the use of mercury for artisanal gold mining and the identification of 250 volunteers for participation in a subsequent health survey.

This survey is part of a larger UNIDO study funded under the Global Environment Facility (GEF) titled 'Removal of Barriers to the Introduction of Cleaner Artisanal Gold Mining and Extraction Technologies'. The field survey was conducted in association with the Department of Geology and Mines (DGM), Government of Lao PDR. Data was collected from eight (8) villages on the Mekong River and the Nam Ou River in Luang Prabang Province during August 2003. The study area is situated approximately 300 km north of Vientiane, consisting predominantly of lowland flood plains.

Primary data was collected by means of interview with the heads and elders of each village, and using questionnaires from a total of 271 randomly selected volunteer households in the villages of Ban Houay Gno, Ban Houay Koh, Ban Houay Lo, Ban Kiad, Ban Latthahai, Ban Pakchek, Ban Pak-Ou and Ban Thinhong. Volunteers from these households have been identified for a possible future health study.

The average size of the eight villages surveyed is 402 persons, with an average of 5.6 persons residing in each household. Six ethnic groups are represented in the region, with the Lao Loum and Lue being the predominant ethnic groups. The region, like much of rural Lao PDR, has low cash incomes (an average of 4.85 million kip or US \$461 per annum in the surveyed villages) and high mortality rates (15.2 deaths per 1,000 persons, 1995 Population Census). On average, 47% of the sampled population recorded experienced a major illness during the last 12 months, with malaria and Acute Respiratory Illness (ARI) being the most common. Three of the eight surveyed villages do not have access to an active medical facility; of those that do, most villages only have access to a pharmacy. Local produce, particularly rice and fish, dominate the diet with the latter forming an important source of protein.

Among the surveyed villages, small-scale artisanal gold mining (ASM) began in the mid-1970s, and was a widespread activity by 1980. ASM is typically carried out at the family level involving men, women and children who are generally lacking in technical skills and sophisticated equipment. The extent of mining activities and the resultant gold outputs vary among villages in the region, with between 45% and 96% of the surveyed households having at least one household member engaged in the activity. The peak mining season is short, primarily between January and April at the end of the dry season when water levels are low, exposing ephemeral islands and other areas of alluvial sediment. Typically, men will operate the equipment, such as shovels and chisels, used for ore / alluvium extraction, while women and children transfer the ore / alluvium to bowls and sluice boards, pan the ore and perform the gold extraction processes (which are usually carried out in the home).

The mining process and the use of mercury vary between villages situated on the Mekong River and villages situated on the Nam Ou River. The process of ore extraction on the riverbank, on ephemeral islands or from the riverbed using simple tools is similar for each of the surveyed villages. However, for villages along the Mekong River, mercury is traditionally added at the panning stage to form an amalgam with alluvial gold particles. The amalgam is subsequently heated to cause the separation of the two elements as the mercury evaporates. Conversely, villages

on the Nam Ou River do not typically use mercury to form an amalgam with the gold, but rather use gravity separation by heating the sieved and panned material and periodically blowing away the concentrate surrounding the gold particles. It is not clear why there is a difference in techniques, although it may be influenced by the size of gold particles within the respective rivers.

Mercury is a relatively expensive input to the mining process in Lao PDR, thus providing an incentive for its recovery and re-use. This is typically carried out in the home, where, being a confined space with limited air displacement, the potential for the inhalation of vaporized mercury is high. In some villages there appears to have been a decline in the industry with a reduction in gold output and mercury use. Mining sites are invariably located in close proximity to the village, and a concentration of activity during the history of mining has possibly reduced the gold content of the alluvial sediments to marginal levels.

In many instances mining appears to be an important source of cash income, although agricultural activities represent the principal occupation of village inhabitants in the region. Typically, households involved in gold mining produce between 10 and 40 grams of gold per year (an average of approximately 24 grams). This corresponds to an average village total of approximately 0.6 Kg per annum. Gold resulting from ASM in the region is sold directly to a gold merchant who periodically visits each of the villages engaged in mining. The gold merchant may be required to further refine the gold prior to sale at a regional market or directly to jewelers.

No obvious signs of mercury poisoning were identified, although a detailed health survey would be needed to confirm this. Household awareness of the potential health implications of exposure to mercury is invariably low. Only a small number of households recorded a general perception of a risk, and generally lacked any data or specific information on what hazards mercury use presented or how these hazards could be avoided. The addition of mercury to the excavated ore generally occurs on the riverbank, thus potentially resulting in contamination of the soil substrate and the adjacent watercourse. This in turn may lead to bioaccumulation in the aquatic food chain upon which village nutritional intake, through fish and other aquatic fauna, is highly dependent.

Women in the surveyed villages are arguably not provided with the opportunities afforded men. Gold mining potentially contributes to bridging inequality due to the sharing of the activity by men and women. However, it may be the women who are primarily exposed to mercury and therefore they should be a focus of future health studies and educational campaigns.

Recommendations

From the results of the current socio-economic survey in villages undertaking artisanal gold mining activities in Luang Prabang Province, Lao PDR, a number of recommendations can be proposed for further investigation and community development in response to the potential environmental and health implications of these activities.

1. Implementation of a preliminary environmental assessment (EA) to clarify the extent of mercury contamination in the environment, including soil and water contamination, bioaccumulation of methyl mercury in aquatic organisms and the effect of mercury vaporization in the atmosphere.
2. Initiation of a preliminary investigation into the extent of mercury poisoning in communities engaged in artisanal gold mining using volunteers identified in this Report. Such a study would necessitate the testing of human samples, atmospheric mercury concentrations (particularly in locations of amalgam heating), and sources of food intake, with an emphasis on aquatic fauna.
3. Development of an effective Lao language education and communication campaign, through which all members of the local community have access to information pertaining to the potential hazards of small scale gold mining (with an emphasis on mercury toxicity) and potential environmental impacts. In addition Lao language communication materials should be developed that identify alternative small-scale gold mining techniques that will reduce current impact levels.
4. Introduction of a pilot study and demonstration to trial proposed improvements to artisanal gold mining technology. The objective of such trials would be to maintain or improve mining efficiency and output with affordable new technologies that significantly reduce negative impacts (particularly those associated with the use of mercury) to the environment and human health.
5. The implementation of capacity building programs for the affordable manufacture of improved mining technologies as described above. Such programs would involve training of local community members and utilize local materials in the manufacturing process.
6. Survey of other areas of Lao PDR where artisanal gold mining is currently being undertaken. This could be conducted during the dry season when artisanal gold mining activities are in progress.

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1. Introduction

Earth Systems Lao was engaged by UNIDO to conduct a baseline sociological survey in Chomphet and Pak-Ou districts within Luang Prabang Province, Lao PDR where artisanal (or small-scale) gold mining is undertaken. A particular focus of the survey was the collection of information about the use of mercury in artisanal gold mining and the identification of a cohort of volunteers for a subsequent health study.

This survey is part of a larger UNIDO study funded under the Global Environment Facility (GEF) titled 'Removal of Barriers to the Introduction of Cleaner Artisanal Gold Mining and Extraction Technologies'. The long-term objective of the UNIDO / GEF study is to assist a pilot suite of developing countries, located in several key trans-boundary river/lake basins (including Lao PDR), in assessing the extent of pollution from current artisanal mining activities, introduce cleaner gold mining and extraction technology which minimises or eliminates mercury releases, and develop capacity and regulatory mechanisms that will enable the sector to minimise negative environmental impacts.

The Department of Geology and Mines (DGM), Government of Lao PDR supported the field survey. Data was collected from eight villages in Luang Prabang Province, Lao PDR, and was conducted in August 2003.

1.1 Small-Scale Artisanal Gold Mining

Individuals, families and / or groups of indigenous people generally lacking in technical skills and sophisticated equipment typically carry out small-scale artisanal gold mining (ASM). The activities vary considerably and are generally not supported by government policy or legal frameworks.

In an increasing number of the world's poorer nations, small-scale artisanal gold mining has been adopted as an alternative to more traditional - and typically less profitable - occupations in agriculture, fisheries, forestry and textiles. Mercury is used in this industry to form an amalgam with small gold particles found in alluvial sediments to facilitate the recovery of gold and thus improving economic outputs.

Mercury is a highly toxic element that has the potential to cause serious damage to environmental and human health. In its methylated form (MeHg), mercury becomes more mobile and can readily bio-accumulate in the soil substrate, rivers, plants and aquatic organisms. It thus presents a potential human health hazard by entering into the food chain through the aquatic ecosystem.

Problems arise from the uncontrolled use of mercury, which can cause premature death and significant environmental degradation. Mercury pollution in water-bodies can also affect downstream populations not involved in ASM. Technical knowledge and support is typically absent from ASM and, coupled with poor organisation results in miners being unable to invest in cleaner and more efficient technologies. Consequently, the artisanal miners are unable to improve their working conditions and thus continue to degrade the environment through inefficient and unproductive techniques.

1.2 Aim & Objectives

The aim of this Study is to collect baseline sociological data from Chomphet and Pak-Ou districts in Luang Prabang Province, a region of Lao PDR where the practice of artisanal gold mining has been identified. It is intended that this data will be used for the design and conduct of a subsequent human health study, which will assess the source and level of mercury exposure in the communities. The data will also be used to identify appropriate technologies that reduce the risk of mercury exposure to the human and natural environment.

Specific study objectives are outlined below:

1. To collect baseline socio-economic, health and environmental data from the villages in the study area (including the identification of 250 volunteers for participation in a subsequent health study).
2. To identify and evaluate the possible means of exposure of villagers to mercury released by small-scale artisanal gold mining.
3. To assess community awareness of the human and environmental health risks associated with exposure to mercury.
4. To evaluate how issues relating to gender can be integrated into mining activities.

The Terms of Reference provided to Earth Systems Lao by UNIDO for conduct of the study are provided in [Appendix 6](#).

1.3 Study Area

The study area is situated along the Mekong River and Nam Ou River in the Province of Luang Prabang, approximately 300 km north of Vientiane (refer to Figure 1.1). The Province covers a total area of 20,000 km², encompassing approximately 420,000 inhabitants in 11 districts.

Following a preliminary field trip by the Department of Geology and Mines (DGM), Government of Lao PDR, eight villages were selected for conduct of the study. These villages are Ban Thinhông, Ban Houay Koh and Ban Houay Gno on the Mekong River (within the district of Chomphet), and Ban Pak-Ou, Ban Houay Lo, Ban Latthahai, Ban Pakchek and Ban Kiad on the Nam Ou River (within the district of Pak Ou). The region consists predominantly of lowland flood plains, with altitude ranging between 200 m and 500 m above sea level, annual precipitation between 1,600 mm and 2,000 mm and an average annual temperature of approximately 24°C (Atlas of Lao, Sisouphanthong 2000).

Socio-economic census data (National Statistics Centre 1995) suggests that local communities are predominantly rural and agrarian. Between 92% and 98% of the economically active population are employed in agriculture with between 64% and 89% of cultivated areas being used for rice production. Cash crops, livestock, vegetable cultivation and small-scale mining activities provide a secondary source of income.

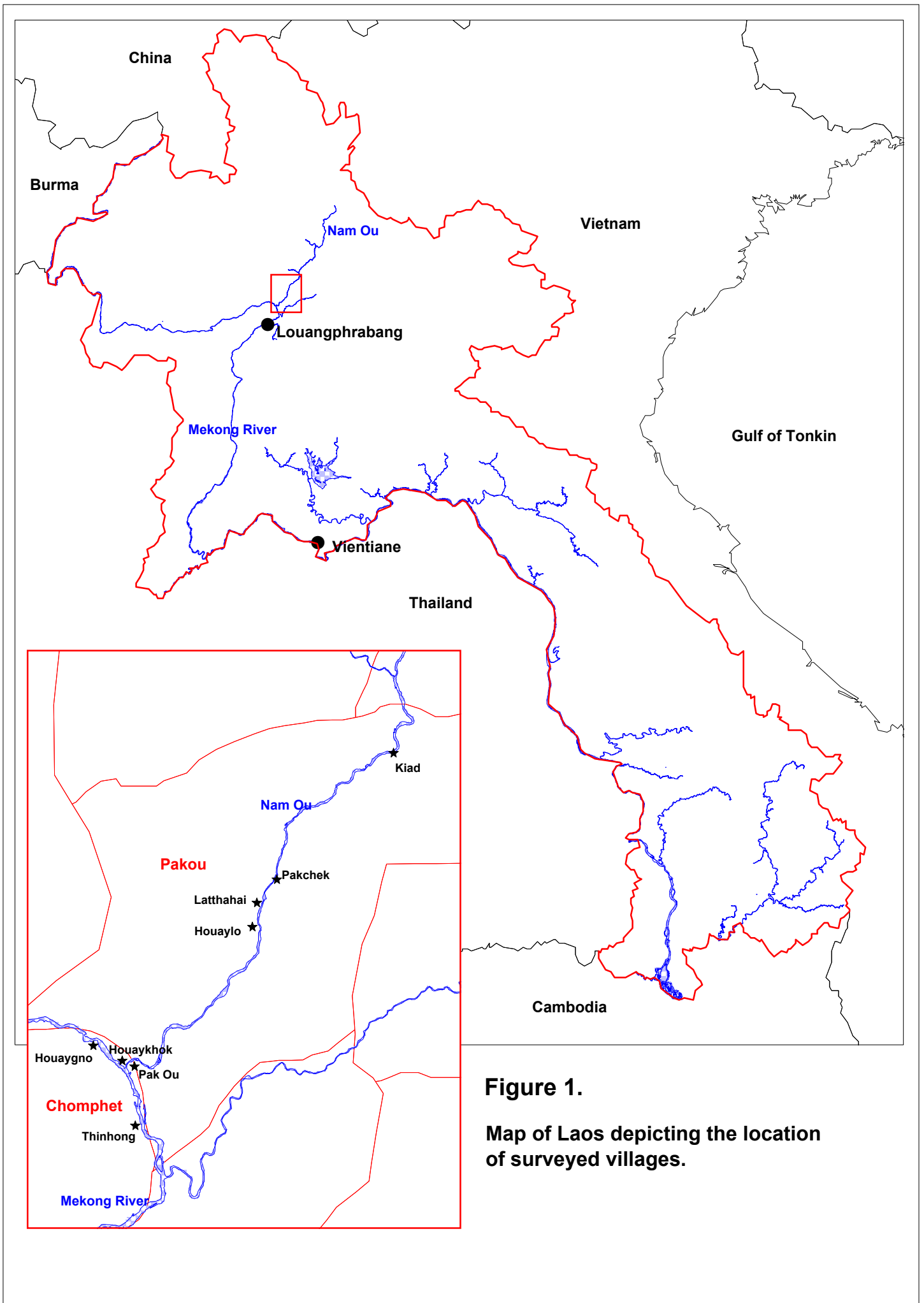


Figure 1.
Map of Laos depicting the location
of surveyed villages.

2. Methodology

Conduct of the Study was undertaken with the close involvement of the Department of Geology and Mines. An outline of the methodology adopted with respect to the Study objectives is provided below.

Objective: **Collect baseline socio-economic, health and environmental data from the villages in the Study Area.**

Methods: Secondary data was obtained through consultation with the following government agencies:

- Department of Geology and Mines at the central and provincial level.
- National Statistics Centre to obtain district profile data.
- Department of Health at the central, provincial and district level. This will also include a visit to the provincial and district medical facilities to review medical records.

Primary data was obtained by means of field survey in eight (8) target villages from 1st – 9th August 2003: Ban Thinhông, Ban Houay Koh and Ban Houay Gno on the Mekong River; and Ban Houay Lo, Ban Kiad, Ban Latthahai, Ban Pakchek and Ban Pak-Ou on the Nam Ou River. The scope of the field survey included an assessment of food composition; eating habits; livelihood activities; demographic information; household socio-economic data; literacy levels; ethnic diversity; access to community infrastructure and utilities. This involved:

- Interview with village chief to develop a village profile. (A copy of the questionnaire is attached in [Appendix 2](#).)
- Interview with a total of 271 randomly selected volunteers from the eight villages. The only condition placed on the selection of volunteers is that they are the 'head of the family' and willing to participate in a subsequent health study. Where possible both husband and wife were interviewed. (A copy of the questionnaire is attached in [Appendix 1](#).)
- Visual survey of the target villages including village level infrastructure,

A feature map was prepared in MapInfo format for each village, on which the houses of the families that participated in the Study are identified, including important infrastructure and topographic features.

Objective: **Identify and evaluate the possible means of exposure of villagers to mercury released by ASM.**

Methods: The field survey included a detailed description of the mining and processing methods used in the Study Area including:

- The source of mercury
- How the miners handle the mercury
- Estimate of the quantity of mercury being used and the quantity lost

These observations were evaluated in light of the broader land and resource use in the Study Area i.e. sources of drinking water and

consumption of aquatic resources.

Objective: **Assess community awareness of the human and environmental health risks arising from exposure to mercury.**

Methods: All Study participants were asked to describe their awareness of the risks arising from exposure to mercury.

Provincial and district health representatives were interviewed to determine whether awareness material had been prepared in the Study Area.

Objective: **Evaluate how issues relating to gender can be integrated into the mining activities.**

Methods: Where possible interviews were conducted with both the male and female head of the household with the aim to:

- Assess the contextual factors that enable or constrain gender integration and hence affect the different outcomes for men and women.
- Identify opportunities for gender integration with the aim to enhance the opportunities, capabilities, security and empowerment of both men and women.

Earth Systems Lao was responsible for survey design and logistics, data collation, analysis and report preparation. The Department of Geology and Mines was responsible for the selection of the survey villages and assisted with field data collection. The participants in the field survey team are listed in [Table 2.1](#) below.

Table 2.1 *Field Survey Team*

| Name | Primary Affiliation |
|---------------------------|---|
| Dr. Vanphanom Sychaleun | Team Leader, Health Research, Earth Systems Lao |
| Mr. Nanong Khotpathoum | Survey Coordination, Earth Systems Lao |
| Dr. Visanou Harnsana | Ministry of Health |
| Mr. Vongthong Thimahaxay | DGM staff, Ministry of Industry and Handicrafts |
| Mr. Somsanith Khammany | Division of Industry, Luang Prabang Province |
| Mr. Somphone Sinpraserth | Division of Industry, Chomphet District |
| Mr. Bounkhong Phonesavanh | Division of Industry, Pak-Ou District |

Other specific methods used for conduct of the sociological analysis are outlined below.

2.1 Population

Data provided by the village head included: total village population, male to female ratios, numbers of households and the average household size. Age distribution data was recorded during household interviews.

2.2 Facilities and Amenities

Information provided by the village head included: drinking water sources, electricity supply, health and education facilities. The availability of other forms of infrastructure and amenities, such as restaurants, barbershops, textile and handicraft outlets etc. were assessed through the ground survey.

2.3 Literacy

As an indication of literacy, heads of households were asked to identify the household members above the age of six who are able to read and write. Households were also asked to identify members who had completed primary (i.e. the 5th primary year typically completed at the age of 12 years) and secondary level schooling (i.e. the 6th secondary year typically completed at the age of 18 years).

2.4 Ethnicity

Households were asked to identify their ethnicity. Typically, all members of a given household will have the same ethnic origin, although exceptions may exist due to inter-ethnic marriages. Note the ethnic classification used for the survey is for major ethnic groups only.

2.5 Diet, Health and Hygiene

Average food consumption was determined by asking households to identify the approximate number of times each food group was consumed in the past week.

As an indication of the health status of the village population, the head of the household was asked to identify the most severe sickness, if any, experienced by members of the household over the past 12 months. Mortality rates were determined by asking the head of each household whether any deaths had occurred in the household in the past 12 months. The total number of recorded deaths was then divided by the sample population of the village, and converted into a figure out of 1,000 persons.

2.6 Socio-Economy

Households were asked to declare their average annual household income¹. The head of the household was asked to identify the primary activity for each household member, which included: academic study, household duties; paid / unpaid employment; retired, sick, too old or too young to engage in any activity.

The primary occupation of the economically active respondents (over the age of 10) was then determined. Economic activities include the following professions: manual laborer, office clerk, teacher, salesperson, agricultural farmer, government official, factory worker, employment in the transport industry, handicraft and textile industry or the army. The percentage of the population regarded as too young for official employment includes all respondents under the age of 10 as well as those respondents over the age of 10 identifying that they were too young to work.

¹ Conversion to US dollars is based on the exchange rate as of 28th August 2003 of 10,500 Lao Kip to the dollar.

2.7 Mining Practices

Heads of the household were asked to identify whether members of the household are either presently involved or had previously been involved in ASM.

The household was asked to identify the approximate quantity of mercury used annually either presently or previously. Based on a preliminary assessment of the efficiencies of the mercury recovery process, data was extrapolated to obtain a measure of the approximate quantity of mercury used by the village and that lost to the environment.

Households were also asked to approximate the quantity of gold produced per year. This data was extrapolated to obtain a measure of the approximate quantity of gold produced by the village. The local units used for measuring gold are *Hun*, where one *Hun* is equivalent to approximately 0.39 grams. Metric units shall henceforth be used through this report.

The village head was asked to provide detail concerning the mining season, the history of mining in the village, and the mining techniques employed by the village. Specific details regarding the mining techniques were confirmed at the household level.

2.8 The Role of Women

The role and status of women was ascertained through conduct of the household surveys. Where possible, the survey team requested interviews with both the male and female head of the household. Gender disaggregated data was collected for schooling, literacy, activity, and health.

3. Results and Discussion

Both primary data from the field survey and secondary data have been collated and analysed, and the results of the sociological baseline study in the eight (8) target villages summarised.

Specific village profiles summarising the data presented below are attached in [Appendix 3](#). Village maps identifying the village level infrastructure, key topographic features and the households who participated in the survey, are presented in [Appendix 4](#). A list of the households who participated in the survey (family names, village of residence, and whether they engaged in mining activities and use mercury) is presented in [Appendix 5](#)

3.1 Population

Among the eight (8) surveyed villages population varies from 187 to 645 persons, as shown in [Table 3.1](#). [Table 3.1](#) also presents the male and female sex ratio for each village. This can be compared with the provincial data for Luang Prabang, with a male to female sex ratio favouring females (0.98:1).

Table 3.1 Demographic data

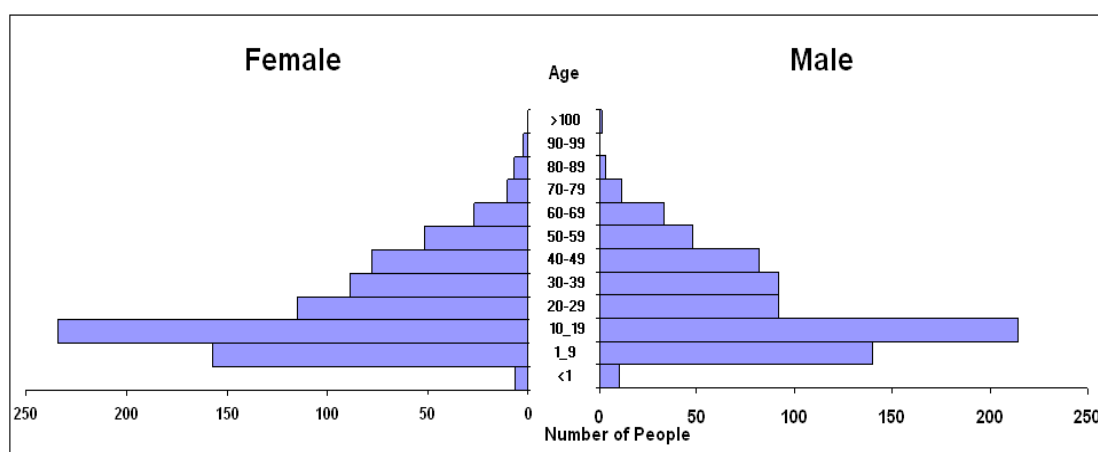
| Village Name | Village Population | | | | Total | Male : Female Sex Ratio |
|---------------------------|--------------------|------|--------|------|-------|-------------------------|
| | Male | % | Female | % | | |
| Ban Houay Gno | 129 | 51.1 | 123 | 48.9 | 252 | 1 : 0.95 |
| Ban Houay Koh | 144 | 50.0 | 144 | 50.0 | 288 | 1 : 1 |
| Ban Houay Lo | 101 | 54.0 | 86 | 45.9 | 187 | 1 : 0.85 |
| Ban Kiad | 313 | 53.9 | 268 | 46.1 | 581 | 1 : 0.86 |
| Ban Latthahai | 347 | 59.8 | 233 | 40.2 | 580 | 1 : 0.67 |
| Ban Pakchek | 291 | 45.1 | 354 | 54.9 | 645 | 0.82 : 1 |
| Ban Pak Ou | 190 | 53.7 | 164 | 46.3 | 354 | 1 : 0.86 |
| Ban Thinhông | 161 | 48.5 | 171 | 51.5 | 332 | 0.94 : 1 |
| <i>Provincial Average</i> | - | - | - | - | - | <i>0.98 : 1</i> |

Between 40% and 53% of the households in the target villages participated in the survey (refer to [Table 3.2](#)). The average household size in the surveyed villages varies from 5.1 to 6.1 household members.

The age distribution displayed by the surveyed villages typically follows the conventional 'broad-based' model, with the greatest number of village inhabitants aged between 10 and 19 years (approximately 51%), and a steady decline in the population aged 20 and above. Only 6 % of the sample population is at the age of 60 or above, reflecting the low life expectancy in the province (approximately 50 years based on the 1995 Population Census, refer to [Figure 3.1](#) and [Table 3.3](#)).

Table 3.2 Household Data

| Village Name | Total Number of Households | Av. Household Size | Number of Households Surveyed | % Households Surveyed |
|---------------------------|----------------------------|--------------------|-------------------------------|-----------------------|
| Ban Houay Gno | 49 | 5.4 | 20 | 41 |
| Ban Houay Koh | 54 | 5.6 | 25 | 46 |
| Ban Houay Lo | 38 | 5.1 | 20 | 53 |
| Ban Kiad | 121 | 5.1 | 49 | 40 |
| Ban Latthahai | 109 | 5.8 | 45 | 41 |
| Ban Pakchek | 125 | 5.5 | 50 | 40 |
| Ban Pak Ou | 63 | 5.8 | 32 | 51 |
| Ban Thinhong | 68 | 6.1 | 30 | 44 |
| <i>Provincial Average</i> | - | 6.1 | - | - |

Figure 3.1 Population pyramid for the combined sample population of the eight surveyed villages**Table 3.3** Age distribution by sex in three broad age categories averaged across the eight surveyed villages

| Age Group | Male (%) | Female (%) | Total (%) |
|------------------|-------------|-------------|------------|
| 0-19 | 47.8 | 52.2 | 50.6 |
| 20-59 | 48.5 | 51.5 | 43.1 |
| 60+ | 51.1 | 48.9 | 6.3 |
| <i>Total (%)</i> | <i>48.3</i> | <i>51.7</i> | <i>100</i> |

3.2 Facilities and Amenities

Facilities and amenities provided in each of the surveyed villages vary with village size and affluence, their relative proximity to a larger township (such as Luang Prabang) and

whether the Lao Government has targeted specific villages for development projects through international aid agencies. [Table 3.4](#) summarises the supply of major facilities in each of the surveyed villages.

The primary source of drinking and cooking water for the surveyed villages is from mountain springs. The water is gravity fed via a pipeline to a communal water outlet (known locally as *Namlin* and shown in [Plate 3.1](#)). However, Ban Kiad sources drinking water from the Nam Ou River, Ban Pakchek from a shallow well, and Ban Thinhông from the Houay Hong Stream.

Major rivers such as the Mekong and Nam Ou, are typically used for washing, bathing, recreational activities and irrigation.

The availability of medical facilities varies among the villages, with four of the surveyed villages having a pharmacy and two villages having a dispensary. It is understood that the dispensaries were established by aid projects. At the time of the survey, Ban Thinhông dispensary had not been supplied with any staff.

Three of the eight villages surveyed (Ban Houay Lo, Ban Latthahai and Ban Pak-Ou) were supplied with electricity.

Table 3.4 Village Level Facilities

| Village Name | Source of Drinking Water | Type of Medical Facility | Supplied with Electricity |
|---------------|--------------------------|--------------------------|---------------------------|
| Ban Houay Gno | <i>Namlin</i> | Pharmacy | No |
| Ban Houay Koh | <i>Namlin</i> | Pharmacy | No |
| Ban Houay Lo | <i>Namlin</i> | None | Yes |
| Ban Kiad | Nam Ou River | None | No |
| Ban Latthahai | <i>Namlin</i> | Dispensary | Yes |
| Ban Pakchek | Storage Well | Pharmacy | No |
| Ban Pak Ou | <i>Namlin</i> | Pharmacy | Yes |
| Ban Thinhông | Houay Hong Stream | Dispensary | No |

Plate 3.1 Communal water outlet (*Namlin*)



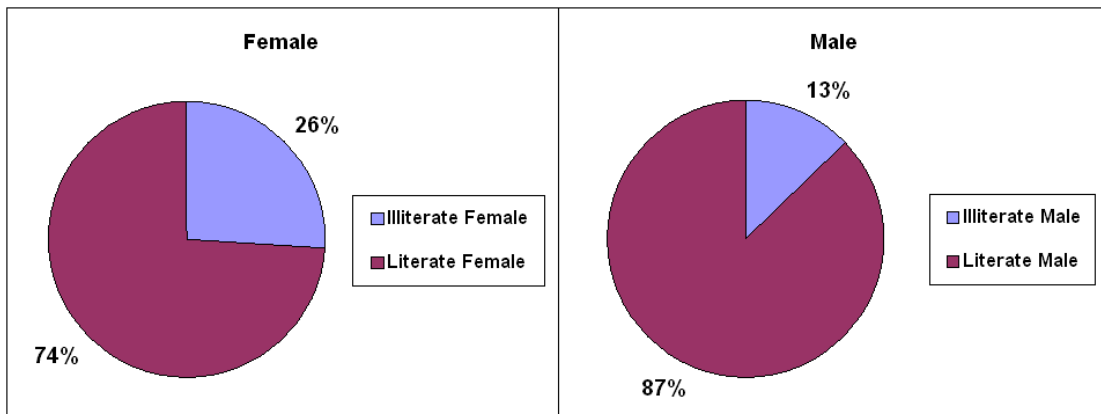
Other amenities present in most villages include barber shops, food shops and temples. Primary schools are present in each of the surveyed villages. Secondary school facilities are only available at the district centers. Small restaurants and textile shops were present in Ban Pak-Ou, due primarily to its promotion as a destination for national and international tourism.

3.3 Literacy

As a measure of literacy, households were asked to identify the household members above the age of six who are able to read and write. For the sample population in each village this measure of literacy varied between 68 and 93%. This is significantly higher than the provincial average of 53% for Luang Prabang (Population Census 1995) highlighting a potential weakness in the survey methodology. Many villages have however benefited from non-formal government education programs and this may have resulted in an exaggeration of the level of literacy.

The literacy rate was highest in Ban Thinhông (90%) and Ban Pak-Ou (93%) and lowest in Ban Kiad (68%). On average men had a greater rate of literacy than women as shown in [Figure 3.2](#).

Figure 3.2 Male and Female Literacy Rates



Approximately 44% of the sample population of all villages reported that they had completed primary school, and approximately 5% had completed secondary school. The proportion of the population having completed primary schooling was highest in Ban Pak-Ou (67%) and lowest in Ban Kiad (24%). The proportion having completed secondary schooling was also highest in Ban Pak-Ou (19%) and lowest in Ban Houay Khok (1%). Once again the overall levels of education were significantly higher than the provincial averages (Population Census 1995) as shown in [Table 3.5](#), highlighting a potential weakness in the survey methodology.

In general a lack of local secondary schools in rural areas and the consequent costs associated with secondary school attendance (transport costs, accommodation and schooling fees) present major difficulties to the majority of children residing in small rural villages.

Table 3.5 Literacy Rates

| Village Name | Literacy Rate (%) | Completed Primary School (%) | Completed Secondary School (%) |
|---------------------------|-------------------|------------------------------|--------------------------------|
| Ban Houay Gno | 86 | 42 | 2 |
| Ban Houay Koh | 78 | 30 | 1 |
| Ban Houay Lo | 89 | 59 | 6 |
| Ban Kiad | 68 | 24 | 2 |
| Ban Latthahai | 80 | 32 | 2 |
| Ban Pakchek | 72 | 36 | 3 |
| Ban Pak Ou | 93 | 67 | 19 |
| Ban Thinhông | 90 | 61 | 10 |
| <i>Provincial Average</i> | <i>53</i> | <i>8</i> | <i>1</i> |

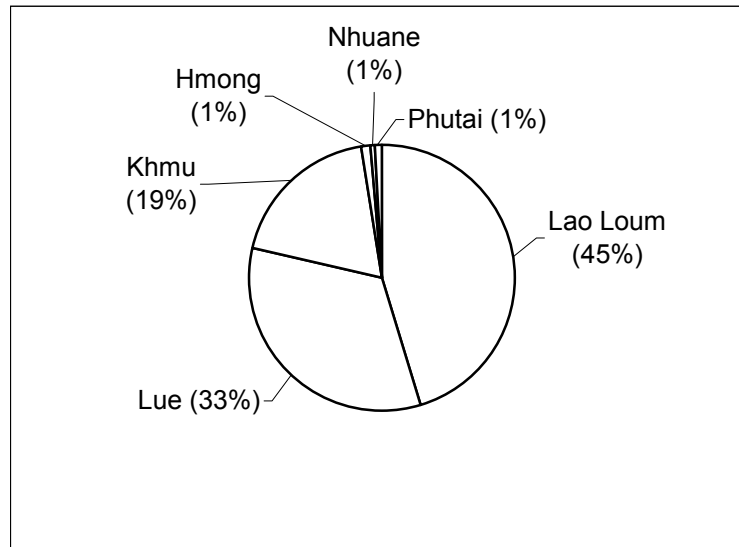
3.4 Ethnicity

Ethnicity varied between the eight villages, with three main ethnic groups and a total of six ethnic groups represented (from a classification system that totals 47). Surveyed households in Ban Pak-Ou and Ban Thinhông were composed entirely of the Lao Loum ethnic group, while households in Ban Kiad were composed of the Lao Loum, Lue, Phutai, Nhuane and Khmu ethnic groups (refer to [Table 3.6](#)).

Table 3.6 Household Ethnicity

| Village Name | Predominant Household Ethnicity (%) | | | | | | Total |
|---------------|-------------------------------------|------|------|--------|--------|-------|-------|
| | Lao Loum | Lue | Khmu | Nhuane | Phutai | Hmong | |
| Ban Houay Gno | 95 | - | - | - | 5 | - | 100 |
| Ban Houay Koh | 52 | - | 48 | - | - | - | 100 |
| Ban Houay Lo | 80 | 15 | - | 5 | - | - | 100 |
| Ban Kiad | 16.3 | 4.1 | 75.5 | 2 | 2 | - | 100 |
| Ban Latthahai | 4.4 | 84.4 | 4.4 | - | - | 6.7 | 100 |
| Ban Pakchek | 6 | 94 | - | - | - | - | 100 |
| Ban Pak Ou | 100 | - | - | - | - | - | 100 |
| Ban Thinhông | 100 | - | - | - | - | - | 100 |

Collectively, the Lao were the predominant ethnicity representing 45% of the households surveyed in the eight villages. The Lue and Khmu ethnicities were represented in 33% and 19% of households respectively; and the Hmong, Nhuane and Phutai were each represented in approximately 1% of the surveyed households, (refer to [Figure 3.3](#)).

Figure 3.3 Summary of Village Ethnicity

3.5 Diet

Local food production includes rice and vegetable cultivation and the rearing of livestock. Food production systems are also completed by fishing and the collection of forest products i.e. wild vegetables, mushrooms, animal, etc. Food is primarily produced and collected for household consumption, although some cash crops and livestock are used for trade between local villages and in regional market places located in the district centres or the provincial capital of Luang Prabang (refer to [Figure 1.1](#)).

Rice is the staple food product throughout the region, and is typically grown in paddy fields located above the river banks and the annual flood zone. Gardens used for vegetable cultivation are typically located away from the river, although small gardens do exist within villages and adjacent to watercourses. For sanitation purposes livestock, with the exception of poultry, is typically kept away from the village area and sources of drinking water.

Fish is the predominant form of dietary protein for the villages in the Study Area. Fishing occurs both on the major waterways such as the Nam Ou River and Mekong River and also on the tributaries during the wet season. Fishing is almost entirely for subsistence purposes, with a small percentage of the sample population in Ban Houay Khok identifying it as an economic activity.

Food consumption did not vary considerably between the surveyed villages (refer to [Table 3.7](#)). As the staple food product throughout the region, rice is invariably consumed at every meal. Vegetables and fish are also consumed with a high frequency, as both are readily available to all of the surveyed villages. Red meat was consumed with considerably less frequency except in Ban Pak-Ou, where it is consumed more than once per day. Poultry (including chicken and/ or duck) and aquatic organisms other than fish (such as fresh water shrimp, snails and crab) were rarely consumed. Eggs and fruit were each consumed between two and seven times per week in the surveyed villages.

Table 3.7 *Weekly Food Consumption*

| Village Name | Average Frequency of Food-Group Consumption Per Week | | | | | | | |
|----------------|--|------------|------------|--------------------|------------|-------------|------------|------------|
| | Rice | Red Meat | Fish | Other Aquatic Food | Eggs | Vegetables | Poultry | Fruit |
| Ban Houay Gno | 21 | 3.0 | 9.7 | 2.0 | 5.5 | 11.9 | 1.4 | 4.9 |
| Ban Houay Koh | 21 | 4.3 | 9.2 | 1.1 | 4.1 | 11.6 | 2.2 | 3.6 |
| Ban Houay Lo | 21 | 3.0 | 11.9 | 0.1 | 4.3 | 10.3 | 2.4 | 4.8 |
| Ban Kiad | 21 | 3.2 | 8.6 | 0.7 | 2.5 | 12.6 | 2.7 | 4.7 |
| Ban Latthahai | 21 | 2.4 | 8.9 | 0.8 | 3.8 | 13.9 | 1.5 | 4.0 |
| Ban Pakchek | 21 | 2.1 | 11.3 | 0.7 | 3.6 | 12.3 | 1.3 | 5.2 |
| Ban Pak Ou | 21 | 8.8 | 9.0 | 0.7 | 6.1 | 11.5 | 3.0 | 6.6 |
| Ban Thinhông | 21 | 4.6 | 6.4 | 1.1 | 6.0 | 9.9 | 2.2 | 5.5 |
| <i>Average</i> | <i>21.0</i> | <i>3.9</i> | <i>9.4</i> | <i>0.9</i> | <i>4.5</i> | <i>11.8</i> | <i>2.1</i> | <i>4.9</i> |

3.6 Health and Hygiene

General health and hygiene standards vary throughout the region and between the surveyed villages. The provincial life expectancy in Luang Prabang is 49 years for males, and 51 years for females (Population Census 1995).

Between 37% and 67% of the sample population of surveyed villages recorded a significant sickness in the previous 12 months. Ban Houay Lo and Ban Kiad recorded the lowest incidence of sickness (34%), while Ban Houay Koh recorded the highest incidence of sickness (67%), as shown in [Table 3.8](#).

Of the recorded illnesses, malaria was typically the most common, followed by Acute Respiratory Illness (ARI) and diarrhoea. Abdominal pain was the least common major illness recorded in each of the surveyed villages. Between 5% and 21% of the sample population in each of the surveyed villages also recorded illnesses other than malaria, ARI, diarrhoea and abdominal pain.

Table 3.8 *Incidence of Sicknesses in the Past 12 Months*

| Village Name | Sample Population Recording Major Sickness in Past 12 mths (%) | Malaria | Diarrhoea | ARI | Abdominal Pain | Other |
|---------------|--|---------|-----------|-----|----------------|-------|
| Ban Houay Gno | 51 | 28 | 4 | 7 | 3 | 9 |
| Ban Houay Koh | 67 | 17 | 8 | 17 | 4 | 21 |
| Ban Houay Lo | 37 | 10 | 3 | 16 | 3 | 5 |
| Ban Kiad | 37 | 14 | 6 | 9 | 1 | 7 |
| Ban Latthahai | 57 | 20 | 11 | 9 | 3 | 14 |
| Ban Pakchek | 40 | 11 | 8 | 9 | 2 | 10 |
| Ban Pak Ou | 47 | 14 | 2 | 9 | 7 | 15 |
| Ban Thinhông | 41 | 14 | 3 | 9 | 3 | 12 |

Among the surveyed villages, the rate of mortality varied between 10 and 65 deaths per 1,000 persons per year as shown in [Table 3.9](#). With the exception of Ban Houay Khok, which recorded a mortality rate of 65, the mortality rates in the other villages are comparable to the provincial average of 15 deaths per 1,000 persons per year (Population Census 1995).

Table 3.9 Village Mortality Rate

| Village Name | Mortality Rate (deaths / 1,000 persons / year) |
|---------------------------|--|
| Ban Houay Gno | (No Data) |
| Ban Houay Koh | 65 |
| Ban Houay Lo | 10 |
| Ban Kiad | 12 |
| Ban Latthahai | 23 |
| Ban Pakchek | 15 |
| Ban Pak Ou | 16 |
| Ban Thinhong | 27 |
| <i>Provincial Average</i> | 15 |

During the conduct of the village level survey, including discussions with provincial and district level health representatives, there were no recorded health impacts directly attributable to small-scale artisanal gold mining activities. However this is set against a background of poor health in the Study area and low awareness of the impacts arising from human exposure to mercury. A more detailed assessment of the risk of exposure to mercury by artisanal gold miners is discussed in [Section 3.8.2](#).

3.7 Socio-economy

The percentage of the sample population classified as economically active varied between 33 and 40% for each village, as shown in [Table 3.10](#). The average household ranged between US \$260 per annum (in Ban Houay Koh) to approximately US \$750 per annum (in Ban Pak-Ou). The average household income among the eight villages is approximately US \$460.

Although the means of subsistence livelihood is similar between the villages, one potential reason for the disparity in village wealth is the influence of tourism. Tourism may potentially make a significant contribution to the cash income of some villages. Ban Pak-Ou for example is frequented by both local and international tourists owing to its proximity to the nearby world heritage-listed Luang Prabang, its elaborate temple ('*Wat Xieng Thong*') and natural limestone caves (such as *Tham Ting* cave).

It should also be noted that villagers may have a tendency to underestimate their cash income for taxation purposes.

Table 3.10 Socio-economic Data of the Sample Population

| Village Name | Population Economically Active (%) | Average Annual Household Income (US\$) |
|---------------------------|------------------------------------|--|
| Ban Houay Gno | 33 | 317 |
| Ban Houay Koh | 37 | 260 |
| Ban Houay Lo | 33 | 613 |
| Ban Kiad | 37 | 356 |
| Ban Latthahai | 36 | 343 |
| Ban Pakchek | 40 | 520 |
| Ban Pak Ou | 32 | 749 |
| Ban Thinhông | 40 | 532 |
| <i>Provincial Average</i> | <i>46</i> | <i>-</i> |

The predominant occupational activity in each of the surveyed villages is agriculture, with a strong emphasis on rice cultivation (refer to [Table 3.11](#)). The rearing of livestock provides an opportunity to trade within regional markets for locally unprocurable food and produce, and is a means of providing protection against unforeseen events (such as natural disasters and medical emergencies).

Table 3.11 Economic Activities of the Sample Population

| Village Name | Economic Activity of Sample Population (%) | | | | | | | | |
|---------------|--|---------------|----------------------|-------------------|----------|-----------------------|-----------|-----------------------|-------|
| | Agriculture /Fisheries | Sales/ Office | Factory/ Manual Work | Govern-ment/ Army | Teaching | Textiles/ Handicrafts | Too Young | Retired/ Sick/Too Old | Other |
| Ban Houay Gno | 50.0 | 0.9 | - | - | 0.9 | - | 43.5 | 3.7 | 0.9 |
| Ban Houay Koh | 47.5 | 1.4 | 2.9 | 0.7 | - | - | 44.6 | 1.4 | 1.4 |
| Ban Houay Lo | 46.5 | 2.0 | 2.0 | - | 2.0 | - | 40.6 | 5.0 | 2.0 |
| Ban Kiad | 52.6 | 2.0 | 0.4 | 0.8 | 0.4 | - | 40.6 | 2.0 | 1.2 |
| Ban Latthahai | 48.7 | - | 0.4 | 0.4 | 0.8 | - | 43.6 | 3.9 | 2.3 |
| Ban Pakchek | 51.3 | 0.7 | 0.7 | 0.7 | 0.4 | - | 38.2 | 5.5 | 2.5 |
| Ban Pak Ou | 32.8 | 12.4 | 0.5 | 3.8 | 3.2 | 1.1 | 40.3 | 1.1 | 3.8 |
| Ban Thinhông | 44.0 | 3.8 | 0.5 | 0.5 | - | 6.0 | 37.5 | 1.6 | 5.4 |

The majority of the population of the surveyed villages are engaged in agriculture and fisheries as their primary economic activity (refer to [Table 3.11](#)). Ban Pak-Ou has a higher proportion of the population engaged in sales and clerical work, government posts and teaching. Six (6) percent of the population of Ban Thinhông were engaged in the production of textiles and handicrafts. The proportion of the sample population regarded as too young to engage in economic activities varied between approximately 38% in Ban Thinhông and 45% in Ban Houay Koh.

Although the household cash income in the surveyed villages is typically low, activities such as textile production and artisanal gold mining, contribute significantly to the

average household income and provide security against the possibility of an unsuccessful agricultural season. As agricultural activities represent the principal occupation of each of the surveyed villages and provide the primary source of subsistence / income, mining is of lesser importance, and carried out only when other sources of cash income have failed, mining conditions are favourable or when time permits. For example, the diverse alternative sources of cash income in Ban Pak-Ou and Ban Thinhông have contributed to the cessation of mining activities in those villages. Nevertheless, the income augmentation provided by ASM in villages situated in the region can be significant, and provide an opportunity for villagers to increase their standard of living and diversify their activities away from a strong reliance on agriculture.

3.8 Mining Practices

In Lao PDR the extent of small-scale artisanal gold mining (ASM) activities is not well documented. The Department of Geology and Mines (DGM) has identified Ban Nakadok in Borikhamxay Province, the Sekong River in Saravanh Province, tributaries of the Nam Ngum in Vientiane Province and the Mekong and Nam Ou Rivers in Luang Prabang Province as locations where ASM is conducted, but the extent and use of mercury is largely unknown.

ASM in Luang Prabang Province began in the mid-1970s, with the peak mining season occurring between March and April (refer to [Table 3.12](#)). This is towards the end of the dry season, when the water level is low enough to allow excavation of the alluvial sediments on exposed riverbanks and ephemeral islands. Typically men will operate equipment used for ore extraction (such as shovels and chisels), while women and children transfer the alluvium to bowls and sluice boards, pan the alluvium and perform the gold extraction processes (which are usually carried out in the home). Artisanal gold mining activities are not considered to be illegal. However, a significant increase in the scale of the activity or in the sophistication of the technology used would indicate that mining was no longer at the artisanal level and would therefore be subject to tax by the Lao Government.

Table 3.12 Mining History and Seasonal Engagement

| Village Name | Commenced Mining | Currently Mining | Mining Season | |
|---------------|------------------|------------------|---------------|--------|
| | | | Start | Finish |
| Ban Houay Gno | 1980 | Yes | January | April |
| Ban Houay Koh | 1987 | Yes | March | April |
| Ban Houay Lo | 1980 | Yes | April | June |
| Ban Kiad | 1981 | Yes | April | May |
| Ban Latthahai | 1982 | Yes | March | April |
| Ban Pakchek | 1978 | Yes | March | April |
| Ban Pak Ou | 1980 | No | December | June |
| Ban Thinhông | 1985 | No | March | April |

The scale of ASM varies somewhat between villages, with some identifying an active participation in the activity and others a decline. Reflecting this variability, the sample population of each village currently engaged in ASM varies between 0% (in Ban Pak-Ou and Ban Thinhông) and 76% (in Ban Latthahai, refer to [Table 3.13](#)).

Where the activity has ceased or is in decline, respective village authorities identified a reduction in the gold output as an important cause. Mining sites are invariably located in

close proximity to the village, and a concentration of activity during the history of mining has potentially caused a reduction in the gold content of the alluvial sediments to uneconomic levels. Furthermore, ASM is perceived to be a difficult activity with only marginal returns. Hence, where alternative sources of a cash income are available (for example through textile manufacturing, rearing livestock and tourism), mining becomes less appealing and may cease altogether.

Table 3.13 Household Mining Activity

| Village Name | Household Mining Activity | | | | | | Total | | Current Status |
|---------------|---------------------------|------|------------------------|------|------------------|------|-------|-----|----------------|
| | Currently Mining | | Mined in the Past Only | | Have Never Mined | | | | |
| | No. | % | No. | % | No. | % | No. | % | |
| Ban Houay Gno | 6 | 30 | 11 | 55 | 3 | 15 | 20 | 100 | Active |
| Ban Houay Koh | 6 | 24 | 12 | 48 | 7 | 28 | 25 | 100 | Active |
| Ban Houay Lo | 8 | 40 | 10 | 50 | 2 | 10 | 20 | 100 | Active |
| Ban Kiad | 2 | 4 | 20 | 40.8 | 27 | 55.1 | 49 | 100 | In Decline |
| Ban Latthahai | 34 | 75.6 | 4 | 8.9 | 7 | 15.5 | 45 | 100 | Active |
| Ban Pakchek | 32 | 53.8 | 16 | 41 | 2 | 5.1 | 50 | 100 | Active |
| Ban Pak Ou | 0 | 0 | 24 | 75 | 8 | 25 | 32 | 100 | Ceased |
| Ban Thinhong | 0 | 0 | 28 | 93.3 | 2 | 6.7 | 30 | 100 | Ceased |

3.8.1 The Mining Process

The ore excavation and gold recovery processes vary between villages situated on the Nam Ou River and those situated on the Mekong River. The processes are illustrated in [Figure 3.4](#) and involve the following steps:

1. Site preparation and removal of the overburden

Riverbanks are cleared of any vegetation or large debris that may interfere with ore extraction, and are checked for structural stability. If underwater excavation of the ore is carried out, a large float is suspended mid-stream from which men will dive to the riverbed and upon which women and children will perform sieving and panning activities.

2. Digging of the excavation pit for mobilisation of the alluvium

The process of alluvium extraction is typically carried out by men, and varies in method depending on the village and the location of the ore extraction site. Simple tools (such as shovels, buckets and long chisels, refer to [Plate 3.2](#)) are used when excavation is performed on the riverbank and on ephemeral islands, loosening the ore and transferring it into buckets for panning and sieving. Underwater excavation employs more specialized tools such as long-handled chisels and weighted buckets, and may involve prolonged dives to facilitate ore collection.

3. Transfer of the alluvium to sluice boards

The alluvium is transferred onto the riverbank or float where it is mixed with water to form slurry which is then passed over sluice boards covered in a thick sack lining, which capture the gold and other dense particles. The sack lining is then removed and washed in a bowl to dislodge the remaining alluvium and concentrated heavy particles.

Plate 3.2 Mining tools**4. Panning and sieving of the ore**

Women and children pan and sieve the remaining material on the riverbank or on floats using head pans, shallow bowls and sieves made from fishing nets (refer to [Plate 3.3](#)). In this way the alluvium is disaggregated further leaving a gold and heavy mineral concentrate (e.g. magnetite).

Plate 3.3 Women panning**5a. Forming an amalgam in villages that use mercury**

If the village uses mercury in the mining process, it is added to the gold / heavy mineral concentrate. The gold particles are trapped by the mercury forming an amalgam.

5b. Heating and blowing in villages that do not use mercury

Following the panning and sieving process, the gold / heavy mineral concentrate is heated in villages that do not use mercury. This dries the concentrate (and may also

liberate mercury impurities trapped with the gold) and with gentle blowing aids in separating the gold from the other heavy minerals.

6a. Removing excess mercury

The mercury-gold amalgam is then squeezed through a fine cloth, and the excess mercury is collected for re-use.

6b. Forming an amalgam and storing for later use

In a number of the villages not identifying the use of mercury on a regular basis, the fine gold-ore concentrate remaining after the 'heating and blowing' stage may nevertheless be added to a small volume of mercury. This is then stored until a sufficient quantity of gold has accumulated to form an amalgam, at which point the amalgam is heated to remove the mercury.

7a. Heating and mercury evaporation

The remaining amalgam is then heated (refer to [Plate 3.4](#)), and the evaporated mercury is collected in a short bamboo tube, erected above the stove. A feather is used to remove the mercury captured in the tube, and citrus is added to it for purification before re-use. The mercury-gold amalgam is not typically heated to separate the two elements on a daily basis. Rather, it is stored until a suitable quantity has accumulated for the purpose of sale to a gold merchant. Depending on the village and gold content of the alluvial sediment, this might be on a weekly or monthly basis. Women and children typically carry out this process in the home.

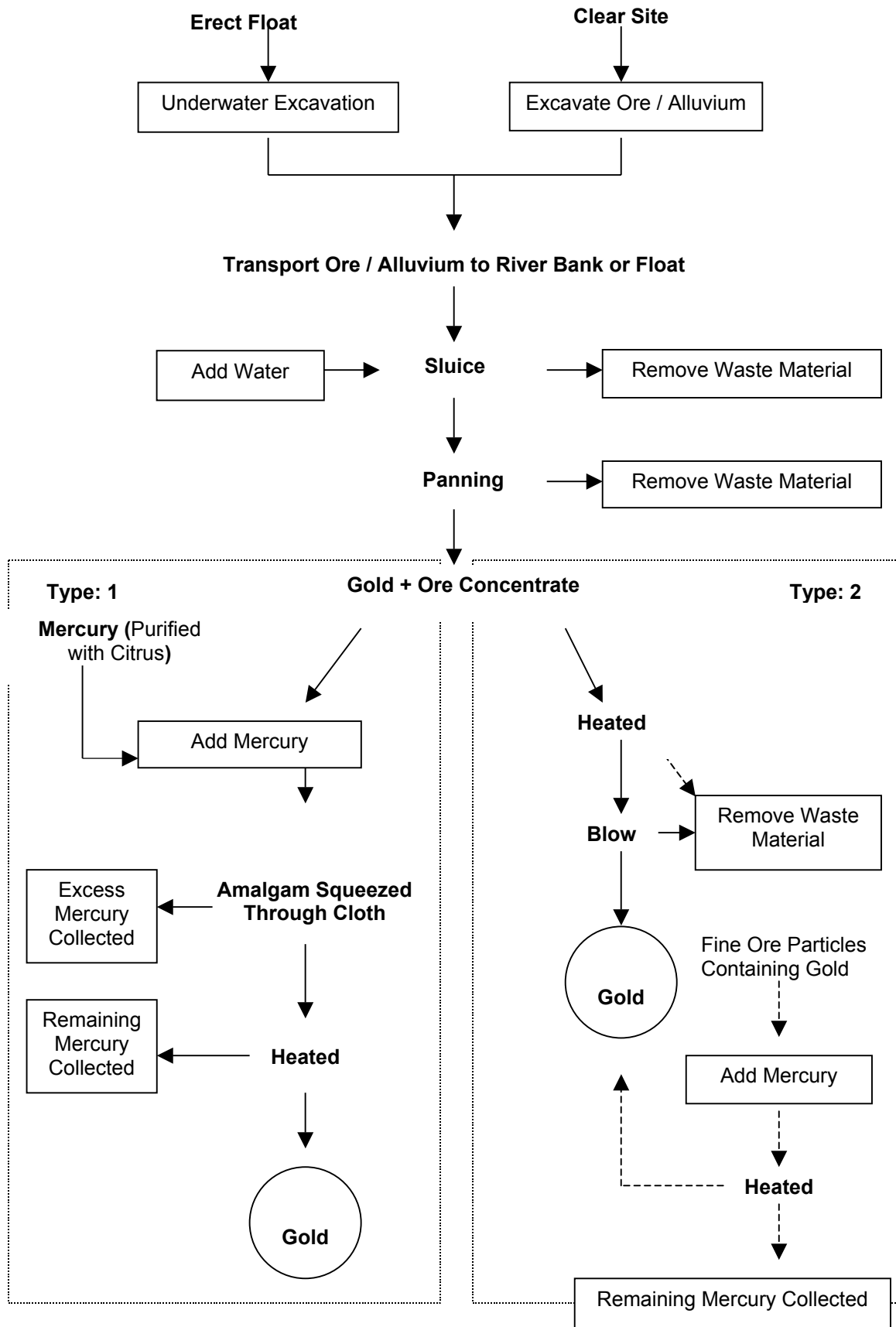
Plate 3.4 Mercury evaporation (without bamboo tube)



8. Sale of the gold

Gold resulting from ASM is sold directly to gold merchants who will visit the villages on a weekly basis during the mining season. The gold merchants typically originate from Luang Prabang and onward sell the gold to larger dealerships. Between 30,000 kip and 35,000 kip (approximately US \$2.8 and \$3.3) will be paid for one *Hun* of gold (approximately 0.39 grams), depending on its purity (e.g. its mercury / silver content). Where the gold contains a quantity of mercury or other impurities, the gold merchant may be required to further refine it prior to sale at a regional market or directly to a jeweler. The gold merchants also provide the villagers with mercury.

Figure 3.4 Summary of the ore extraction and gold recovery processes



3.8.2 Environmental Contamination and Human Exposure to Mercury

Observations and inquiries at the village level were used to make a preliminary assessment of potential environmental impacts resulting from ASM activities. The following mining processes and techniques have been identified as potentially degrading the environment:

1. Ore or alluvium extraction causing sedimentation within the water course
2. Ore or alluvium extraction on the riverbanks causing bank erosion
3. Mercury contamination of the riverbank soil substrate
4. Mercury contamination of the water course, aquatic biota and up the food chain
5. Mercury contamination of the atmosphere in the amalgam burning process

Table 3.14 illustrates that although all of the surveyed villages (with the exception of Ban Pakchek) have previously used mercury in the mining process, it is currently only used in four villages (Ban Houay Gno, Ban Houay Koh, Ban Houay Lo and Ban Latthahai).

Table 3.14 Extent of Household Mercury Use

| Village Name | Household Mercury Use | | | | | | Total No. of Households |
|---------------|-----------------------|----|-----------------------------|----|-------------------------|-----|-------------------------|
| | Currently Use Mercury | | Not Currently Using Mercury | | Have Never Used Mercury | | |
| | No. | % | No. | % | No. | % | |
| Ban Houay Gno | 6 | 30 | 11 | 55 | 3 | 15 | 20 |
| Ban Houay Koh | 6 | 24 | 12 | 48 | 7 | 28 | 25 |
| Ban Houay Lo | 5 | 25 | 9 | 45 | 6 | 30 | 20 |
| Ban Kiad | 0 | 0 | 4 | 8 | 45 | 92 | 49 |
| Ban Latthahai | 10 | 22 | 7 | 16 | 28 | 62 | 45 |
| Ban Pakchek | 0 | 0 | 0 | 0 | 50 | 100 | 50 |
| Ban Pak Ou | 0 | 0 | 23 | 72 | 9 | 28 | 32 |
| Ban Thinhông | 0 | 0 | 28 | 93 | 2 | 7 | 30 |

The principal means through which mercury loss could occur have been identified as the panning and sieving stage (where mercury is added to form an amalgam on river floats or on the riverbank), and during amalgam heating (where mercury is lost to the atmosphere). The close proximity of the panning and sieving process to the watercourse introduces the potential for water contamination, which can result in mercury accumulation in aquatic organisms used as a food source.

Despite the incentive for its recovery and re-use resulting from its relatively high cost, it is estimated that only half of those households burning amalgam make an attempt at recovering the vaporized mercury, and of those households making this attempt the recovery process is estimated to be 75% successful (i.e. one quarter of the mercury is lost). This recovery process is typically carried out in the home, where, being a confined space with limited air displacement, the potential for the inhalation of vaporized mercury is high. Although a quantitative assessment of mercury loss to the environment from each village was not possible, it has been estimated as approximately two thirds of the mercury used per annum. Therefore, of the estimated 2,431 grams of mercury used per

annum in the eight surveyed villages, approximately 1,600 grams are lost to the environment (refer to [Table 3.15](#)).

Table 3.15 *Mercury Mass Balance*

| Village Name | Current Hg Use per Mining Household (grams/ annum) | Estimated Hg Use per Village (grams / annum) | Estimated Hg Lost (grams / annum) |
|---------------|--|--|-----------------------------------|
| Ban Houay Gno | 40 | 592 | 397 |
| Ban Houay Koh | 44 | 576 | 386 |
| Ban Houay Lo | 36 | 343 | 230 |
| Ban Kiad | 0 | 0 | 0 |
| Ban Latthahai | 38 | 920 | 616 |
| Ban Pakchek | 0 | 0 | 0 |
| Ban Pak Ou | 0 | 0 | 0 |
| Ban Thinhông | 0 | 0 | 0 |
| Total | - | 2,431 | 1,629 |

The degree of human exposure to mercury is related directly to the scale of ASM activities and the quantity of mercury use in the region. The quantities of mercury employed in gold amalgamation are invariably small, typically around 40 grams per household per annum (refer to [Plate 3.5](#) and [Table 3.15](#)).

Plate 3.5 *1 Hong of mercury (approx. 38 grams)*



3.8.3 Risk Awareness

Household awareness of the potential health implications of exposure to mercury is invariably low, with only 4 households (13%) in Ban Thinhông, and 1 household (4%) in Ban Houay Koh indicating a general perception of risk, but lacking any data or specific information on what hazards mercury use presented or how these hazards could be avoided. The lack of hazard awareness has important implications for future capacity building and educational campaigns.

3.8.4 Gold Production

All of the surveyed villages were currently, or had previously been engaged in mining activities. Average household gold production varied between villages, with Ban Houay Lo recording the highest annual gold production (approximately 38 grams) and Ban Kiad the lowest annual gold production (approximately 9 grams).

There is no clear distinction between the average household gold production in villages on the Mekong River (Ban Houay Gno, Ban Houay Koh and Ban Thinhông) and villages on the Nam Ou River.

Current gold production varied significantly between the surveyed villages (refer to [Table 3.16](#)). Current gold production per household is highest in Ban Latthahai (17.3 grams per annum), Ban Houay Lo (15.3 grams per annum) and Ban Pakchek (12.2 grams per annum). Ban Pakchek and Ban Latthahai are currently producing an annual village total of 1.52 Kg and 1.89 Kg per annum, respectively. Conversely, Ban Pak-Ou and Ban Thinhông are not currently engaged in mining and are therefore not producing any gold. The total village gold production in Ban Kiad is only 44 grams per annum, a consequence of only 4% of households currently engaged in mining activities.

With a total gold production among the eight villages of approximately 4.8 Kg per annum, and a total mercury use of approximately 2.4 Kg per annum, the gold production to mercury use ratio is approximately 1: 0.5. This suggests that villages in the region do not rely heavily on the use of mercury, as the typical gold to mercury ratio for artisanal gold mining is 1: 3.

Table 3.16 Average Gold Production

| Village Name | Ave. Au Production for Mining Households (grams / annum) | Ave. Au Production for Mining & Non-mining Households (grams / annum) | Extrapolated Village Au Production (Kg / annum) |
|---------------|--|---|---|
| Ban Houay Gno | 19 | 5.7 | 280 |
| Ban Houay Koh | 37 | 8.9 | 480 |
| Ban Houay Lo | 38 | 15.3 | 580 |
| Ban Kiad | 9 | 0.4 | 44 |
| Ban Latthahai | 23 | 17.3 | 1,890 |
| Ban Pakchek | 19 | 12.2 | 1,520 |
| Ban Pak Ou | 0 | 0 | 0 |
| Ban Thinhông | 0 | 0 | 0 |
| Total | - | - | 4,790 |

3.9 The Role of Women

Women in rural Lao society are generally considered to be provided with less opportunities compared to those afforded to men. Women (and children) are responsible for performing duties perceived to be easier and of less importance than duties performed by men, such as cooking, weaving, sowing rice and collecting water (refer to [Plate 3.6](#)). For example the commercial weaving and textile industry in Ban Thinhông, is predominantly carried out by women and children. Nevertheless, of the surveyed

population, females were the head of the household in an average of 11% of households among the eight villages, and responded independently to 25% of the questionnaires (refer to [Table 3.17](#)).

Table 3.17 Gender comparison of heads-of-households and questionnaire respondents

| Village Name | Head of Household (%) | | Questionnaire Respondents (%) | | |
|----------------|-----------------------|-----------|-------------------------------|-----------|-----------------|
| | Male | Female | Male | Female | Male and Female |
| Ban Houay Gno | 100 | 0 | 45 | 0 | 55 |
| Ban Houay Koh | 92 | 8 | 60 | 24 | 16 |
| Ban Houay Lo | 85 | 15 | 30 | 25 | 45 |
| Ban Kiad | 94 | 6 | 65 | 20 | 14 |
| Ban Latthahai | 93 | 7 | 76 | 13 | 11 |
| Ban Pak Ou | 72 | 28 | 22 | 56 | 22 |
| Ban Pakchek | 84 | 6 | 44 | 14 | 42 |
| Ban Thinhông | 90 | 10 | 30 | 47 | 23 |
| Average | 89 | 11 | 47 | 25 | 29 |

Plate 3.6 A young girl weaving at home



The respective roles of men and women in small-scale artisanal gold mining are clearly defined, with men having the responsibility of alluvium excavation, and women (often assisted by one or more children from the family) performing the panning, sieving and gold recovery processes. The respective roles of men and women in the mining process are therefore relevant to the potential for exposure to mercury. Men are probably less exposed to mercury directly through mining activities, whereas women and children mining in villages using mercury would potentially be exposed on a daily basis. All work associated with mining is considered difficult, a typical working day consisting of traveling long distances to suitable mining locations and long hours of sun exposure.

Furthermore, the tasks of both men and women are essential for the successful recovery of gold and thus both are seen equally to contribute to the gold-derived household income.

4. Conclusions

A baseline sociological study was conducted by Earth Systems Lao in Luang Prabang Province, Lao PDR, with a focus on small-scale artisanal gold mining (ASM) and the use of mercury in these activities.

Between 40% and 53% of households in the eight (8) villages were surveyed, all of which were currently, or had previously been engaged in mining activities. The average size of the eight villages surveyed is 402 persons, with an average of 5.6 persons residing in each household. Six ethnic groups are represented in the region, with the Lao Loum and Lue being the predominant ethnic groups.

The region, like much of rural Lao PDR, has low cash incomes (an average of 4.85 million kip or US \$461 per annum in the surveyed villages) and high mortality rates (15.2 deaths per 1,000 persons, 1995 Population Census). On average, 47% of the sampled population recorded experienced a major illness during the last 12 months, with malaria and Acute Respiratory Illness (ARI) being the most common. Three of the eight surveyed villages do not have access to an active medical facility; of those that do, most villages only have access to a pharmacy. Local produce, particularly rice and fish, dominate the diet with the latter forming an important source of protein.

Among the surveyed villages, small-scale artisanal gold mining (ASM) began in the mid-1970s, and was a widespread activity by 1980. ASM is typically carried out at the family level involving men, women and children who are generally lacking in technical skills and sophisticated equipment. The extent of mining activities and the resultant gold outputs vary among villages in the region, with between 45% and 96% of the surveyed households having at least one household member engaged in the activity.

The peak mining season is short, primarily between January and April at the end of the dry season when water levels are low, exposing ephemeral islands and other areas of alluvial sediment. Typically, men will operate the equipment, such as shovels and chisels, used for ore / alluvium extraction, while women and children transfer the ore / alluvium to bowls and sluice boards, pan the ore and perform the gold extraction processes (which are usually carried out in the home).

The mining process and the use of mercury vary between villages situated on the Mekong River and villages situated on the Nam Ou River. The process of ore extraction on the riverbank, on ephemeral islands or from the riverbed using simple tools is similar for each of the surveyed villages.

However, for villages along the Mekong River, mercury is traditionally added at the panning stage to form an amalgam with alluvial gold particles. The amalgam is subsequently heated to cause the separation of the two elements as the mercury evaporates. Conversely, villages on the Nam Ou River do not typically use mercury to form an amalgam with the gold, but rather use gravity separation by heating the sieved and panned material and periodically blowing away the concentrate surrounding the gold particles. It is not clear why there is a difference in techniques, although it may be influenced by the size of gold particles within the respective rivers.

Mercury is a relatively expensive input to the mining process in Lao PDR, thus providing an incentive for its recovery and re-use. This is typically carried out in the home, where, being a confined space with limited air displacement, the potential for the inhalation of vaporized mercury is high. In some villages there appears to have been a decline in the industry with a reduction in gold output and mercury use. Mining sites are invariably located in close proximity to the village, and a concentration of activity during the history

of mining has possibly reduced the gold content of the alluvial sediments to marginal levels.

In many instances mining appears to be an important source of cash income, although agricultural activities represent the principal occupation of village inhabitants in the region. Typically, households involved in gold mining produce between 10 and 40 grams of gold per year (an average of approximately 24 grams). This corresponds to an average village total of approximately 0.6 Kg per annum. Gold resulting from ASM in the region is sold directly to a gold merchant who periodically visits each of the villages engaged in mining. The gold merchant may be required to further refine the gold prior to sale at a regional market or directly to jewelers.

No obvious signs of mercury poisoning were identified, although a detailed health survey would be needed to confirm this. Household awareness of the potential health implications of exposure to mercury is invariably low. Only a small number of households recorded a general perception of risk, and generally lacked any data or specific information on what hazards mercury use presented or how these hazards could be avoided. The addition of mercury to the excavated ore generally occurs on the riverbank, thus potentially resulting in contamination of the soil substrate and the adjacent watercourse. This in turn may lead to bioaccumulation in the aquatic food chain upon which village nutritional intake, through fish and other aquatic fauna, is highly dependent.

An investigation of the mining process has revealed that, in those villages using mercury as an amalgamation agent, the primary means of environmental contamination and human exposure occur at the panning and amalgam burning stages. Among the eight villages surveyed, it is estimated that approximately two thirds of the mercury used per annum will be lost to the environment (approximately 1,600 g). Approximately 4.8 Kg of gold are produced per annum among the eight surveyed villages.

Women in the surveyed villages are arguably not provided with the opportunities afforded men. Gold mining potentially contributes to bridging inequality due to the sharing of the activity by men and women. However, it may be the women who are primarily exposed to mercury and therefore they should be a focus of future health studies and educational campaigns.

It is expected that the information provided in the current report will assist in the preparation of a future health study focusing on the effects of mercury exposure, and may lead to the identification of potential means of improving the current mining technology to ameliorate the hazards to human health and the environment. Specific recommendations from the study have been detailed.

Appendix 1. Household Questionnaire

**Project Name: Removal Of Barriers To The Introduction Of Cleaner
Artisanal Gold Mining And Extraction Technologies**

**Project funded by the United Nations Industrial Development Organisation (UNIDO) in
association with the Department of Geology and Mines**

Introduction:

The purpose of this Study is to conduct a survey of mining practices along the Nam Khong and Nam Ou rivers. This will involve a village and household level survey to gather baseline socio-economic data and to describe the mining methods being used.

Request to speak to the person who knows best about the livelihood activities of the household. In most cases this is likely to be the head of the household. Where possible request that the interview is conducted with both the male and female head of the household.

Request the consent of the household to be interviewed

Questionnaire ID No.:

Household ID No.:

Village Name: _____

District Name: _____

Date of survey: _____

Name of Principal Surveyor: _____

Name of Enumerator 1: _____

Name of Enumerator 2: _____

Respondent (male): First Name: _____

Family Name: _____

Respondent (female): First Name: _____

Family Name: _____

| For all persons | | | | | | | | | | For persons aged 6 years and above | | For persons aged 10 years and above | | |
|--|---|--|------------------------------|---|--|--|--|---|---|--|---|---|--|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| Who is a member of this household? <i>Insert name</i> | What is relationship to head of household? 1 Head 2 Spouse 3 Son/Daughter 4 Parent 5 Other relative 6 Not related | Is male or female? 1 Male 2 Female | How old? <i>Enter age</i> | Number of years living in this village? | What is citizenship? <i>Enter code from code list</i> | What is ethnic origin? <i>Enter code from code list</i> | What is marital status? 1 Never married 2 Married 3 Divorced/separated 4 Widowed | What is religion? <i>Enter code from code list</i> | Major sickness in the last 2 years? 1 No 2 Malaria 3 ARI 4 Diarrhoea 5 Abdominal pain 6 Other | Can read and write Lao? 1 Yes 2 No | Has ever attended school? 1 Never been 2 At school 3 Left school | What is highest level of education completed? <i>Enter code from code list</i> | What was main activity the last 12 months? <i>Enter code from code list</i> | What was main occupation during the last 12 months? <i>Enter code from code list</i> |
| 1 | 1 2 3 4 5 6 | 1 2 | | | | | | | | 1 2 | 1 2 3 | | | |
| 2 | 1 2 3 4 5 6 | 1 2 | | | | | | | | 1 2 | 1 2 3 | | | |
| 3 | 1 2 3 4 5 6 | 1 2 | | | | | | | | 1 2 | 1 2 3 | | | |
| 4 | 1 2 3 4 5 6 | 1 2 | | | | | | | | 1 2 | 1 2 3 | | | |
| 5 | 1 2 3 4 5 6 | 1 2 | | | | | | | | 1 2 | 1 2 3 | | | |
| 6 | 1 2 3 4 5 6 | 1 2 | | | | | | | | 1 2 | 1 2 3 | | | |
| 7 | 1 2 3 4 5 6 | 1 2 | | | | | | | | 1 2 | 1 2 3 | | | |
| 8 | 1 2 3 4 5 6 | 1 2 | | | | | | | | 1 2 | 1 2 3 | | | |

A2 SOCIO-ECONOMIC INFORMATION

16 What is the approximate average annual income of your household?

0 - 2M Kip 2M Kip to 5M Kip 5M - 10M Kip > 10M Kip

17 Who in your household manages the income?

Head Spouse of head
 Son/Daughter of head Other

18 Who in your family manages the expenditure?

Head Spouse of head
 Son/Daughter of head Other

A3 HOUSING CHARACTERISTICS

19 What is the tenure status of the household?

Owner / purchaser Tenant
 Lodger Other

20 Type of dwelling unit?

Concrete Timber Bamboo

Other (specify): _____

21 Is the dwelling unit electrified?

No Yes (own meter) Yes (share meter)
 Yes (own generator) Yes (car battery)

22 What is the household's main source of energy for cooking?

Electricity Paraffin Charcoal Gas
 Wood Coal Sawdust Other

23 What is the living area of the dwelling unit?

m²

<Mark the location of the dwelling on the village map - include Household ID No.>

A4 WATER FOR DRINKING AND COOKING

24 What is the household's main source of water for drinking and cooking?

Piped water in/outside Well/borehole
 River/stream/dam Rainwater from tank/jar

Other (specify): _____

25 Distance from house to the main source of water for drinking and cooking?

m

<Mark the location of the water source on the village map>

26 Is drinking water treated before use?

Yes No

If so how? Boiled Filtered Other (specify) _____

27 Are you satisfied with the quality of your drinking water? Yes No

If no, why not? _____

28 Who most commonly collects the drinking / cooking water in your household?

- Head Spouse of head
 Son/Daughter of head Other

A5 SOURCES OF FOOD

29 For each of the following food groups identify:

- (i) The number of meals over the past 7 days when this food group has been eaten;
- (ii) The source of the food.

| Food Group | No. Times | Source (tick the appropriate boxes) | | | |
|--------------------|----------------------|-------------------------------------|---|----------------------------------|---------------------------------|
| Red meat | <input type="text"/> | <input type="checkbox"/> Market | <input type="checkbox"/> Family livestock | <input type="checkbox"/> Forest | |
| Chicken / duck | <input type="text"/> | <input type="checkbox"/> Market | <input type="checkbox"/> Family livestock | <input type="checkbox"/> Forest | |
| Eggs | <input type="text"/> | <input type="checkbox"/> Market | <input type="checkbox"/> Family livestock | <input type="checkbox"/> Forest | |
| Vegetables | <input type="text"/> | <input type="checkbox"/> Market | <input type="checkbox"/> Garden | <input type="checkbox"/> Swidden | <input type="checkbox"/> Forest |
| Fruits | <input type="text"/> | <input type="checkbox"/> Market | <input type="checkbox"/> Garden | <input type="checkbox"/> Forest | |
| Rice | <input type="text"/> | <input type="checkbox"/> Market | <input type="checkbox"/> Paddy field | <input type="checkbox"/> Swidden | <input type="checkbox"/> Forest |
| Fish | <input type="text"/> | <input type="checkbox"/> Market | <input type="checkbox"/> Fishpond | <input type="checkbox"/> River | |
| Other aquatic food | <input type="text"/> | <input type="checkbox"/> Market | <input type="checkbox"/> Fishpond | <input type="checkbox"/> River | |
| Other | <input type="text"/> | <input type="checkbox"/> Market | <input type="checkbox"/> Family livestock | <input type="checkbox"/> Forest | |

A6 DEATHS IN THE HOUSEHOLD AND HYGIENE

30 Did any death occur in the household in the last 12 months? (also children at birth) Yes No

If Yes:

| # | Was the deceased male or female? 1 Male 2 Female | How old was the deceased? Age in years | For woman aged 15 to 49 years: Did she die while pregnant, while giving birth or within 42 days after giving birth? 1 Yes 2 No |
|---|---|---|--|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |

31 What type of toilet facility is mainly used by the household?

- Flush toilet Dry toilet Other None

Has anyone in your family been engaged in mining activities? (Either currently or previously)

If yes, continue to PART B of the questionnaire

If no, thank the respondent for their cooperation, and ask the respondent whether they would be prepared to participate in a follow-up health survey at a later date?

Yes

No

Additional observations of the Surveyor: _____

<Only complete this survey if someone in the household has been engaged in mining activities>
<Request to speak to the person who knows best about the mining activities of the household>

B.1 ARTISANAL MINING INFORMATION

- 1. How many years ago did you start mining? years

- 2. Do you continue to engage in mining activities each year? Yes No

- 2.1 If not, why did you stop mining? _____

- 3. Over what period of the year do you engage in mining activities? _____

- 3.1 On average how many hours per day do you spend mining? hours

- 4. Who inspired you to start mining ? Yourself Partner Parent Other

- 5. When you are mining, do you work by yourself? Yes No

- 5.1 If not, how many people do you work with? Family Friends Labour

- 6. Where exactly do you conduct your mining activities? _____

B.2 EQUIPMENT AND INPUTS

7. Briefly outline each step in the gold extraction process, including: the technology/equipment; quantity of materials used; and time taken.

Collection of the ore: _____

Preparation of the ore: _____

Amalgamation: _____

Gold recovery: _____

8. Do you have any plans to change this process in the future? Yes No

If so, how? _____

9. Have you ever used mercury for amalgamation of the gold? Past Present Never

10. Where do you buy your mercury? _____

10.1 From whom do you buy your mercury? _____

11. What is the average cost of the mercury per unit weight? per ml or; per kg

12. On average, how much mercury do you use per week? ml or; kg

13. On average, how much gold can be amalgamated with this quantity of mercury? grams

14. How do you store the mercury? _____

15. How frequently do you burn amalgam? Several times a day Once a day Once a week
 Several times a week Other _____

16. Do you bring your work clothes / equipment into the house at the end of the day? Yes No

17. What are the major problems you encounter when producing gold? _____

18. Are you aware of any health hazards associated with the use and handling of mercury? Yes No

If yes, what are the hazards? _____

Who informed you about these hazards? _____

B.3 MARKET

19. Where specifically do you sell your gold? _____
20. Do you encounter any problems when selling your gold? _____
21. What is the average market value of the gold you sell? per gram

B.4 TRAINING

22. Have you received any training regarding your mining activities? Yes No
- If so, who provided the training? _____
- Where was the training provided? _____

B.5 IMPROVED MINING TECHNOLOGIES

<Provide a short description of the improved mining technology>

23. Would you be interested to apply these methods to your mining activities? Yes No
- Explain why: _____
24. Would the introduction of these methods adversely affect your mining activities? Yes No
- Explain why: _____

Thank the respondent for their cooperation.

Would the respondent be prepared to participate in a follow up health survey at a later date? Yes No

Additional observations of the Surveyor: _____

Appendix 2. Village Head Questionnaire

**Project Name: Removal Of Barriers To The Introduction Of Cleaner
Artisanal Gold Mining And Extraction Technologies**

**Project funded by the United Nations Industrial Development Organisation (UNIDO) in
association with the Department of Geology and Mines**

Introduction:

The purpose of this Study is to conduct a survey of mining practices along the Nam Khong and Nam Ou rivers. This will involve a village and household level survey to gather baseline socio-economic data and to describe the mining methods being used.

Request to speak to the village chief/s and request consent to be interviewed.

Have the residents of this village ever been engaged in artisanal gold mining activities? Yes No

Have the residents of this village ever been engaged in other forms of mining? Yes No

If no to both of these questions, terminate the survey in this village. Only survey villages where there has been a history of mining.

Questionnaire ID No.: _____

Village Name: _____

District Name: _____

Date of survey: _____

Name of Principal Surveyor: _____

Name of Enumerator 1: _____

Name of Enumerator 2: _____

Village Chief 1: First Name: _____

Family Name: _____

Village Chief 2: First Name: _____

Family Name: _____

C1 INTRODUCTION

1 Age of the Respondent: years

2 Number of years the respondent has lived in this village: years

3 Number of years as village head: years

C2 DEMOGRAPHIC INFORMATION

4 Population of the village:

5 Approximate number of men: Approximate number of women:

6 Number of households in the village?

C3 SOCIAL INFRASTRUCTURE

7 Is there a doctor or nurse living in the village? Yes No

If not, how many times per year would a district or provincial level health practitioner typically visit the village?

times per year

8 Is there a health volunteer in the village? Yes No

9 Are there any health facilities in the village? Yes No

If so, what type? Dispensary Pharmacy Health centre

10 Where is the main medical centre used by the people in your village?

Specify location: _____

11 Has there been any major illness in the village over the last two years? Yes No

If so, what type of sickness?

Malaria Respiratory Infection Diarrhoea Abdominal pain

Other (*specify*) _____

12 Where is the main market used by the village for buying and selling produce?

Specify location: _____

13 Where is the B143 primary school used by the children of the village?

Specify location: _____

14 Approximately how many children in the village use this primary school? number persons

15 Where is the main secondary school used by the children of the village?

Specify location: _____

16 Approximately how many children in the village use this primary school? number persons

C4 AMENITIES

17 What are the main sources of water for drinking and cooking in the village?

- Piped water in/outside
- River/stream/dam
- Well/borehole
- Rainwater from tank/jar

Other (specify): _____

<Mark the location of each water source on the village map>

18 Where are the main fishing spots for the village?

<Mark the location of each fishing spot on the village map>

What types of aquatic species are collected from the river?

- Fish
- Shrimp
- Shell fish
- River grass

Other (specify) _____

19 Is the village supplied with electricity? Yes No

C5 ARTISANAL MINING INFORMATION

20 Have the residents of this village ever been engaged in artisanal gold mining activities? Yes No

21 Have the residents of this village ever been engaged in other forms of mining? Yes No

If yes, what resources are mined? (specify): _____

22 Approximately how many village members are involved with artisanal gold mining?

23 Where are the main gold mining sites located?

<Mark the location of the mining areas on the village map>
<Visit each site and record any observations>

24 During what months of the year is the mining performed? _____

25 For how many years have people been mining in this village / area? years

What is the historical background to the mining in this area? _____

26 Is the source of the gold known? Yes No
 If Yes, specify Hardrock Alluvial Mine waste Other _____

27 Does the village authority encourage / support mining? Yes No

What are the benefits of mining to the village? Please describe:

What are the negative impacts of the mining for the village? Please describe:

28 Has there been an influx of gold-prospectors to the area? Yes No
 If yes, explain: _____

29 Does the village authority have any plans to change its mining activities? Yes No
 If yes, how? Technology used Area of mining
 Period of mining Other _____

30 Does the village authority control the mining activities i.e. the number of people mining or the identification of suitable sites? Yes No
 If yes, how? _____

31 Are gold-derived incomes taxed by the village? Yes No

C6 EQUIPMENT AND INPUTS

32 Briefly outline each step in the gold extraction process, including: the technology/equipment; quantity of materials used; and time taken.

Collection of the ore: _____

Preparation of the ore: _____

Amalgamation: _____

Gold recovery: _____

33 Is mercury used for amalgamation of the gold? Yes No

If yes, where is the mercury bought? (*specify*) _____

34 What are the major problems encountered when producing gold? _____

35 Are you aware of any health hazards associated with the use and handling of mercury? Yes No

If yes, what are the hazards? _____

Who informed you about these hazards? _____

C7 MARKET

36 Approximately how much gold is produced by the village? grams per month

37 Where is the gold typically sold? (*specify*) _____

C8 IMPROVED MINING TECHNOLOGIES

38 Have villagers received any training regarding their mining activities? Yes No

If so, who provided the training? _____

Where was the training provided? _____

<Provide a short description of the improved mining technology>

39 Would you be interested to apply these methods to the mining activities in the village? Yes No

Explain why: _____

40 Would the introduction of these methods adversely affect the mining activities? Yes No

Explain why: _____

Thank the respondent for their cooperation.

Appendix 3. Village Profiles

Appendix 3: Village Profiles

Village : Ban Houaygno

UNIDO: Global Mercury Project

District: Chomphet **River:** Mekong

Village Population: 252 **Male:** 129 **Female:** 123
No. of Households: 49 **Average Household Size:** 5.4 **No. of Surveyed Households:** 20

| <i>Occupation of Sample Population</i> | <i>Percent</i> |
|--|----------------|
| Agriculture | 50 |
| Salesperson | 1 |
| Teacher | 1 |
| Retired / Sick/ Too Old | 4 |
| Others | 1 |
| Too Young | 44 |

| <i>Most Significant Sickness in Past 12 Months</i> | <i>Percent</i> |
|--|----------------|
| None | 49 |
| Malaria | 28 |
| Other | 9 |
| ARI | 7 |
| Diarrhoea | 4 |
| Abdominal pain | 3 |

| <i>Food Group:</i> | <i>Average Frequency of Consumption per Week</i> |
|--------------------|--|
| Chicken/duck | 1 |
| Eggs | 5 |
| Fish | 10 |
| Fruits | 5 |
| Other | 0 |
| Other aquatic food | 2 |
| Red meat | 3 |
| Rice | 21 |
| Vegetables | 12 |

Average Annual Household Income: US\$ 317 3,325,000 Kip

Health Facilities in the Village: Pharmacy

Mortality Rate: No Data (death/1000 persons/year)

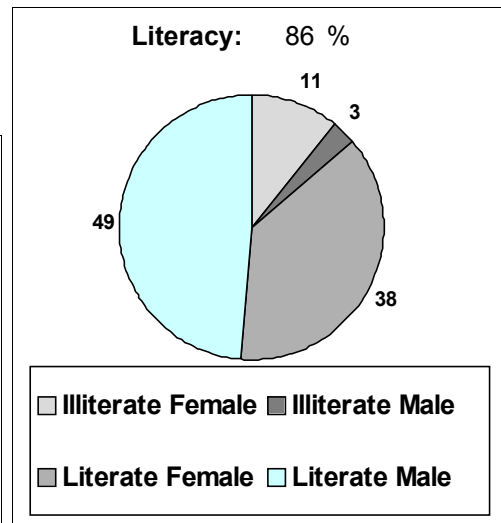
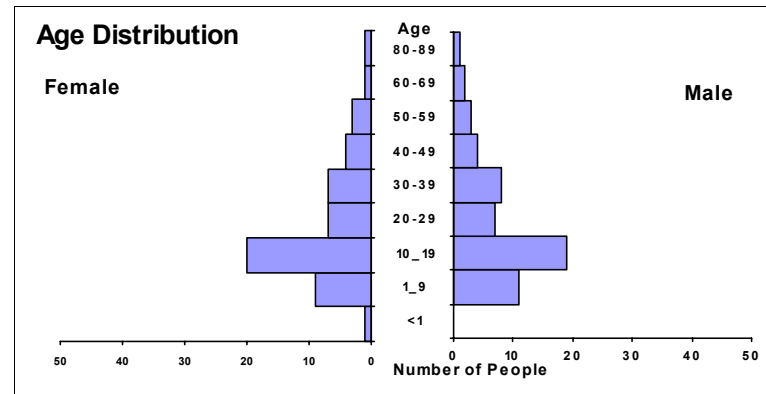
Primary Source of Drinking Water: Mountain Spring

Is the Village Supplied with Electricity: No

Completed Primary School (%): 42

Completed Secondary School (%): 2

| <i>Ethnicity:</i> | <i>Percent</i> |
|-------------------|----------------|
| Lao Loum | 95 |
| Phutai | 5 |



Approximate Date The Village Commenced Mining : 1980

Mining Season: January To: April

Average Mercury Use Per Mining Household Per Year: 40 g

Predicted Village Mercury Use Per Year: 592 g

Average Gold Production Per Mining Household Per Year: 19 g

Predicted Village Gold Production Per Year: 279 g

| <i>Households Using Mercury:</i> | <i>Percent</i> |
|----------------------------------|----------------|
| Past: | 55 |
| Present: | 30 |
| Never: | 15 |

| <i>Households Engaged in Mining:</i> | <i>Percent</i> |
|--------------------------------------|----------------|
| Currently Mining: | 30 |
| Mined in Past Only: | 55 |
| Never Mined: | 15 |

Appendix 3: Village Profiles

Village : Ban Houay Koh

UNIDO: Global Mercury Project

District: Chomphet **River:** Mekong

Village Population: 288 **Male:** No Data **Female:** No Data
No. of Households: 54 **Average Household Size:** 5.6 **No. of Surveyed Households:** 25

| <i>Occupation of Sample Population</i> | <i>Percent</i> |
|--|----------------|
| Agriculture | 47 |
| Fisheries | 1 |
| Salesperson | 1 |
| Factory Worker | 3 |
| Government Official | 1 |
| Retired / Sick/ Too Old | 1 |
| Others | 1 |
| Too Young | 45 |

| <i>Most Significant Sickness in Past 12 Months</i> | <i>Percent</i> |
|--|----------------|
| None | 34 |
| Other | 21 |
| Malaria | 17 |
| ARI | 17 |
| Diarrhoea | 8 |
| Abdominal pain | 4 |

| <i>Food Group:</i> | <i>Average Frequency of Consumption per Week</i> |
|--------------------|--|
| Chicken/duck | 2 |
| Eggs | 4 |
| Fish | 9 |
| Fruits | 4 |
| Other | 1 |
| Other aquatic food | 1 |
| Red meat | 4 |
| Rice | 21 |
| Vegetables | 12 |

Average Annual Household Income: US\$ 260 2,732,000 Kip

Health Facilities in the Village: Pharmacy

Mortality Rate: 65 (death/1000 persons/year)

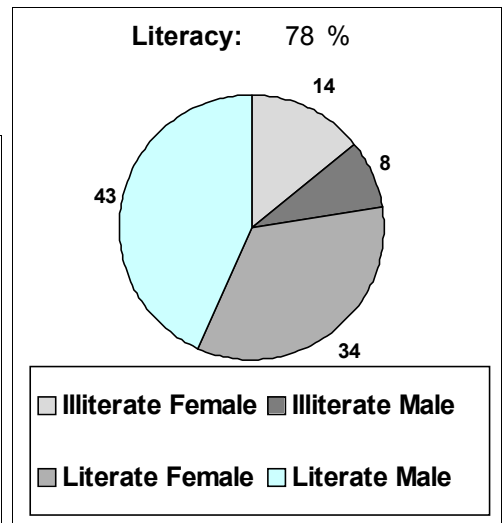
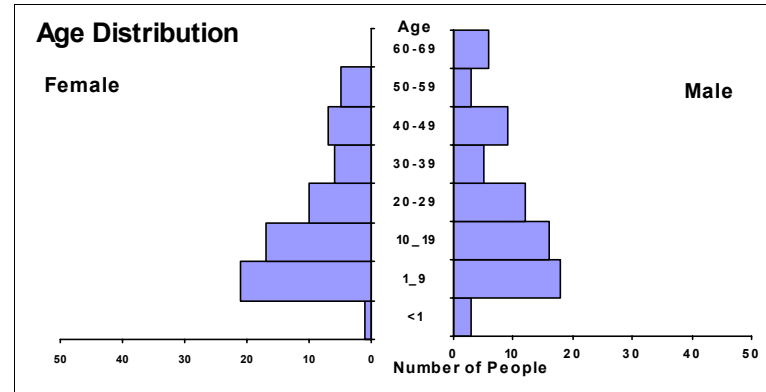
Primary Source of Drinking Water: Mountain Spring

Is the Village Supplied with Electricity: No

Completed Primary School (%): 30

Completed Secondary School (%): 1

| <i>Ethnicity:</i> | <i>Percent</i> |
|-------------------|----------------|
| Lao Loum | 52 |
| Khmu | 48 |



Approximate Date The Village Commenced Mining : 1987

Mining Season: March To: April

Average Mercury Use Per Mining Household Per Year: 44 g

Predicted Village Mercury Use Per Year: 576 g

Average Gold Production Per Mining Household Per Year: 37 g

Predicted Village Gold Production Per Year: 480 g

| <i>Households Using Mercury:</i> | <i>Percent</i> |
|----------------------------------|----------------|
| Past: | 48 |
| Present: | 24 |
| Never: | 28 |

| <i>Households Engaged in Mining:</i> | <i>Percent</i> |
|--------------------------------------|----------------|
| Currently Mining: | 24 |
| Mined in Past Only: | 48 |
| Never Mined: | 28 |

Appendix 3: Village Profiles

Village : **Ban Houaylo**

UNIDO: Global Mercury Project

District: Pak Ou River: Nam Ou

Village Population: 187 Male: 101 Female: 86
 No. of Households: 38 Average Household Size: 5.1 No. of Surveyed Households: 20

| Occupation of Sample Population | Percent |
|---------------------------------|---------|
| Agriculture | 47 |
| Salesperson | 1 |
| Teacher | 2 |
| Office Clerk | 1 |
| Manual Labour | 2 |
| Retired / Sick/ Too Old | 5 |
| Others | 2 |
| Too Young | 41 |

| Most Significant Sickness in Past 12 Months | Percent |
|---|---------|
| None | 63 |
| ARI | 16 |
| Malaria | 10 |
| Other | 5 |
| Diarrhoea | 3 |
| Abdominal pain | 3 |

| Food Group: | Average Frequency of Consumption per Week |
|--------------------|---|
| Chicken/duck | 2 |
| Eggs | 4 |
| Fish | 12 |
| Fruits | 5 |
| Other | 0 |
| Other aquatic food | 0 |
| Red meat | 3 |
| Rice | 21 |
| Vegetables | 10 |

Average Annual Household Income: US\$ 613 6,440,000 Kip

Health Facilities in the Village: None

Mortality Rate: 10 (death/1000 persons/year)

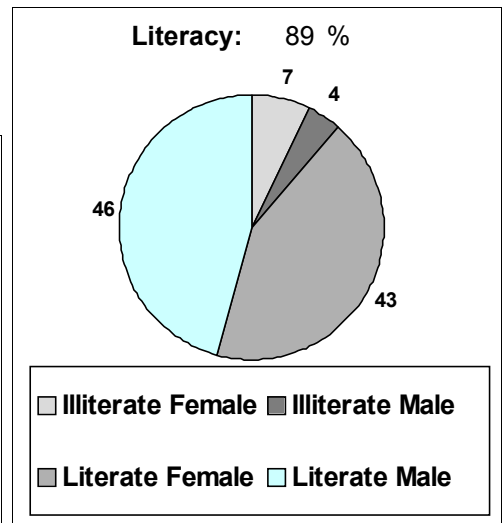
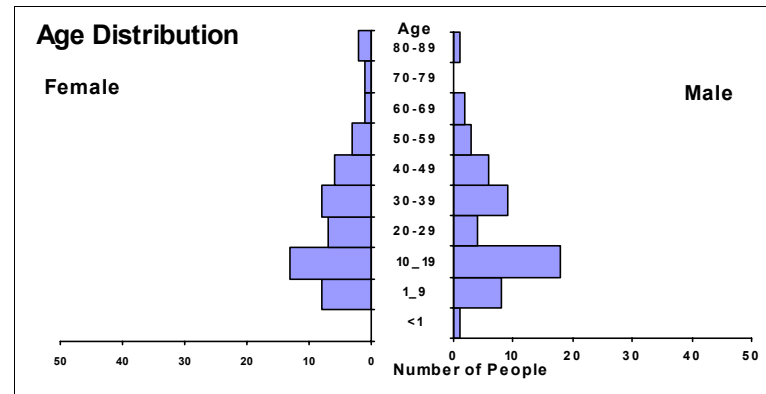
Primary Source of Drinking Water: Mountain Spring

Is the Village Supplied with Electricity: Yes

Completed Primary School (%): 59

Completed Secondary School (%): 6

| Ethnicity: | Percent |
|------------|---------|
| Lao Loum | 80 |
| Lue | 15 |
| Nhuane | 5 |



Approximate Date The Village Commenced Mining : 1980

Mining Season: April To: June

Average Mercury Use Per Mining Household Per Year: 36 g

Predicted Village Mercury Use Per Year: 343 g

Average Gold Production Per Mining Household Per Year: 38 g

Predicted Village Gold Production Per Year: 578 g

| Households Using Mercury: | Percent |
|---------------------------|---------|
| Past: | 45 |
| Present: | 25 |
| Never: | 30 |

| Households Engaged in Mining: | Percent |
|-------------------------------|---------|
| Currently Mining: | 40 |
| Mined in Past Only: | 50 |
| Never Mined: | 10 |

Appendix 3: Village Profiles

Village : **Ban Kiad**

UNIDO: Global Mercury Project

District: Pak Ou River: Nam Ou

Village Population: 581 Male: 313 Female: 268
 No. of Households: 121 Average Household Size: 5.1 No. of Surveyed Households: 49

| Occupation of Sample Population | Percent |
|---------------------------------|---------|
| Agriculture | 53 |
| Salesperson | 2 |
| Teacher | 0 |
| Factory Worker | 0 |
| Government Official | 1 |
| Retired / Sick/ Too Old | 2 |
| Others | 1 |
| Too Young | 41 |

| Most Significant Sickness in Past 12 Months | Percent |
|---|---------|
| None | 65 |
| Malaria | 14 |
| ARI | 9 |
| Other | 7 |
| Diarrhoea | 6 |
| Abdominal pain | 1 |

| Food Group: | Average Frequency of Consumption per Week |
|--------------------|---|
| Chicken/duck | 3 |
| Eggs | 2 |
| Fish | 9 |
| Fruits | 5 |
| Other | 0 |
| Other aquatic food | 1 |
| Red meat | 3 |
| Rice | 21 |
| Vegetables | 13 |

Average Annual Household Income: US\$ 356 3,736,735 Kip

Health Facilities in the Village: None

Mortality Rate: 12 (death/1000 persons/year)

Primary Source of Drinking Water: Nam Ou River

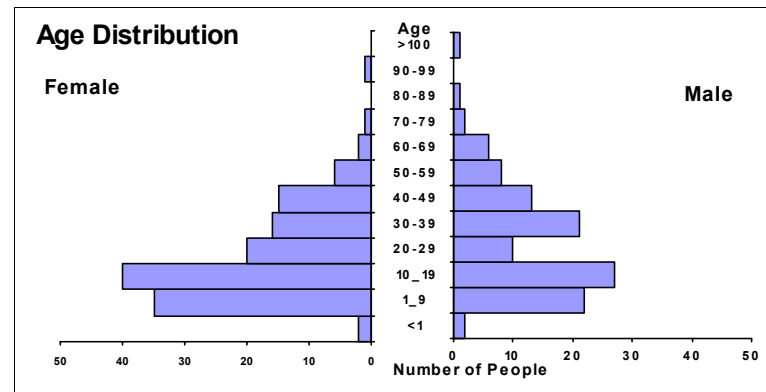
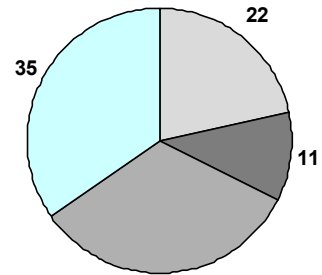
| Ethnicity: | Percent |
|------------|---------|
| Lao Loum | 16.33 |
| Phutai | 2.04 |
| Khmu | 75.51 |
| Lue | 4.08 |
| Nhuane | 2.04 |

Is the Village Supplied with Electricity: No

Completed Primary School (%): 24

Completed Secondary School (%): 2

Literacy: 68 %



Approximate Date The Village Commenced Mining : 1981

Mining Season: April To: May

Average Mercury Use Per Mining Household Per Year: 38 g

Predicted Village Mercury Use Per Year: 0 g

Average Gold Production Per Mining Household Per Year: 9 g

Predicted Village Gold Production Per Year: 44 g

| Households Using Mercury: | Percent |
|---------------------------|---------|
| Past: | 8 |
| Present: | 0 |
| Never: | 92 |

| Households Engaged in Mining: | Percent |
|-------------------------------|---------|
| Currently Mining: | 4 |
| Mined in Past Only: | 41 |
| Never Mined: | 55 |

Appendix 3: Village Profiles

Village : **Ban Latthahai**

UNIDO: Global Mercury Project

District: Pak Ou River: Nam Ou

Village Population: 580 Male: 347 Female: 233
 No. of Households: 109 Average Household Size: 5.8 No. of Surveyed Households: 45

| Occupation of Sample Population | Percent |
|---------------------------------|---------|
| Agriculture | 49 |
| Teacher | 1 |
| Factory Worker | 0 |
| Government Official | 0 |
| Retired / Sick/ Too Old | 4 |
| Others | 2 |
| Too Young | 44 |

| Most Significant Sickness in Past 12 Months | Percent |
|---|---------|
| None | 43 |
| Malaria | 20 |
| Other | 14 |
| Diarrhoea | 11 |
| ARI | 9 |
| Abdominal pain | 3 |

| Food Group: | Average Frequency of Consumption per Week |
|--------------------|---|
| Chicken/duck | 2 |
| Eggs | 4 |
| Fish | 9 |
| Fruits | 4 |
| Other | 0 |
| Other aquatic food | 1 |
| Red meat | 2 |
| Rice | 21 |
| Vegetables | 14 |

Average Annual Household Income: US\$ 343 3,600,000 Kip

Health Facilities in the Village: Local Clinic/ Hospital

Mortality Rate: 23 (death/1000 persons/year)

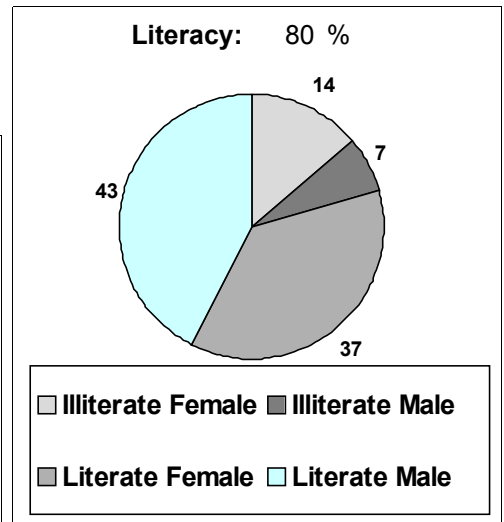
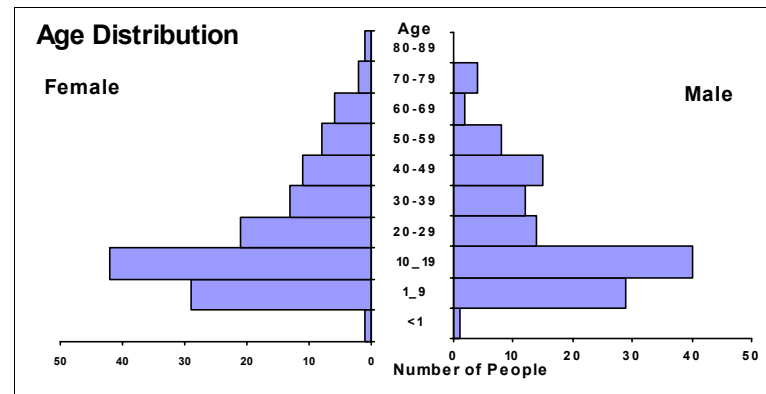
Primary Source of Drinking Water: Mountain Spring

| Ethnicity: | Percent |
|------------|---------|
| Lao Loum | 4.44 |
| Khmu | 4.44 |
| Hmong | 6.67 |
| Lue | 84.44 |

Is the Village Supplied with Electricity: Yes

Completed Primary School (%): 32

Completed Secondary School (%): 2



Approximate Date The Village Commenced Mining : 1982

Mining Season: March To: April

Average Mercury Use Per Mining Household Per Year: 38 g

Predicted Village Mercury Use Per Year: 920 g

Average Gold Production Per Mining Household Per Year: 23 g

Predicted Village Gold Production Per Year: 1894 g

| Households Using Mercury: | Percent |
|---------------------------|---------|
| Past: | 16 |
| Present: | 22 |
| Never: | 62 |

| Households Engaged in Mining: | Percent |
|-------------------------------|---------|
| Currently Mining: | 76 |
| Mined in Past Only: | 9 |
| Never Mined: | 16 |

Appendix 3: Village Profiles

Village : **Ban Pakchek**

UNIDO: Global Mercury Project

District: Pak Ou River: Nam Ou

Village Population: 645 Male: 291 Female: 354
 No. of Households: 125 Average Household Size: 5.5 No. of Surveyed Households: 50

| Occupation of Sample Population | Percent |
|---------------------------------|---------|
| Agriculture | 51 |
| Livestock | 1 |
| Salesperson | 0 |
| Teacher | 0 |
| Office Clerk | 0 |
| Transport | 1 |
| Factory Worker | 1 |
| Government Official | 1 |
| Retired / Sick/ Too Old | 5 |
| Others | 1 |
| Too Young | 38 |

| Most Significant Sickness in Past 12 Months | Percent |
|---|---------|
| None | 61 |
| Malaria | 11 |
| Other | 10 |
| ARI | 9 |
| Diarrhoea | 8 |
| Abdominal pain | 2 |

| Food Group: | Average Frequency of Consumption per Week |
|--------------------|---|
| Chicken/duck | 1 |
| Eggs | 4 |
| Fish | 11 |
| Fruits | 5 |
| Other | 0 |
| Other aquatic food | 1 |
| Red meat | 2 |
| Rice | 21 |
| Vegetables | 12 |

Average Annual Household Income: US\$ 520 5,462,000 Kip

Health Facilities in the Village: Pharmacy

Mortality Rate: 15 (death/1000 persons/year)

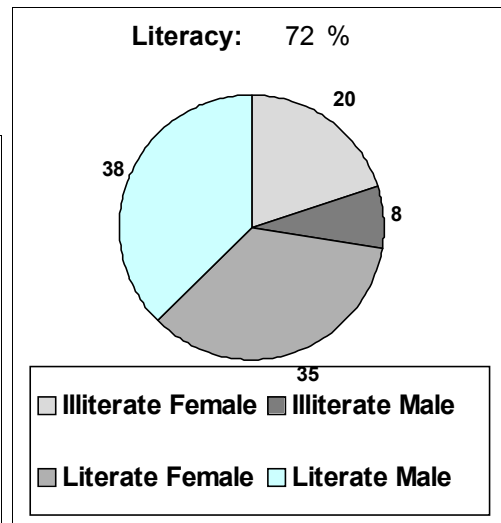
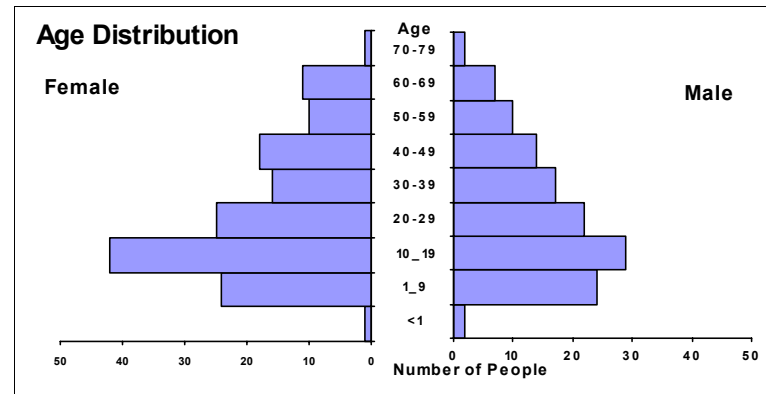
Primary Source of Drinking Water: Shallow Well

Is the Village Supplied with Electricity: No

Completed Primary School (%): 36

Completed Secondary School (%): 3

| Ethnicity: | Percent |
|------------|---------|
| Lao Loum | 6 |
| Lue | 94 |



Approximate Date The Village Commenced Mining : 1978

Mining Season: March To: April

Average Mercury Use Per Mining Household Per Year: No Data

Predicted Village Mercury Use Per Year: No Data

Average Gold Production Per Mining Household Per Year: 19 g

Predicted Village Gold Production Per Year: 1520 g

| Households Using Mercury: | Percent |
|---------------------------|---------|
| Past: | 0 |
| Present: | 0 |
| Never: | 100 |

| Households Engaged in Mining: | Percent |
|-------------------------------|---------|
| Currently Mining: | 64 |
| Mined in Past Only: | 32 |
| Never Mined: | 4 |

Appendix 3: Village Profiles

Village : **Ban Pak Ou**

UNIDO: Global Mercury Project

District: Pak Ou River: Nam Ou

Village Population: 354 Male: 190 Female: 164
 No. of Households: 63 Average Household Size: 5.8 No. of Surveyed Households: 32

| Occupation of Sample Population | Percent |
|---------------------------------|---------|
| Agriculture | 33 |
| Handicraft | 1 |
| Textiles | 1 |
| Salesperson | 12 |
| Teacher | 3 |
| Office Clerk | 2 |
| Transport | 1 |
| Factory Worker | 1 |
| Army | 1 |
| Government Official | 3 |
| Retired / Sick/ Too Old | 1 |
| Others | 3 |
| Too Young | 40 |

| Most Significant Sickness in Past 12 Months | Percent |
|---|---------|
| None | 55 |
| Other | 15 |
| Malaria | 14 |
| ARI | 9 |
| Abdominal pain | 7 |
| Diarrhoea | 2 |

| Food Group: | Average Frequency of Consumption per Week |
|--------------------|---|
| Chicken/duck | 3 |
| Eggs | 6 |
| Fish | 9 |
| Fruits | 7 |
| Other | 0 |
| Other aquatic food | 1 |
| Red meat | 9 |
| Rice | 21 |
| Vegetables | 11 |

Average Annual Household Income: US\$ 749 7,868,750 Kip

Health Facilities in the Village: Pharmacy

Mortality Rate: 16 (death/1000 persons/year)

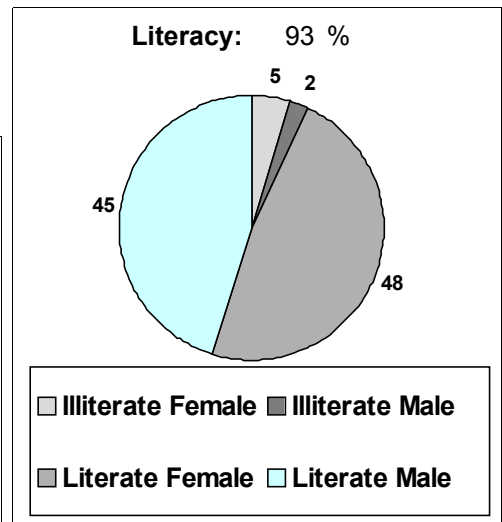
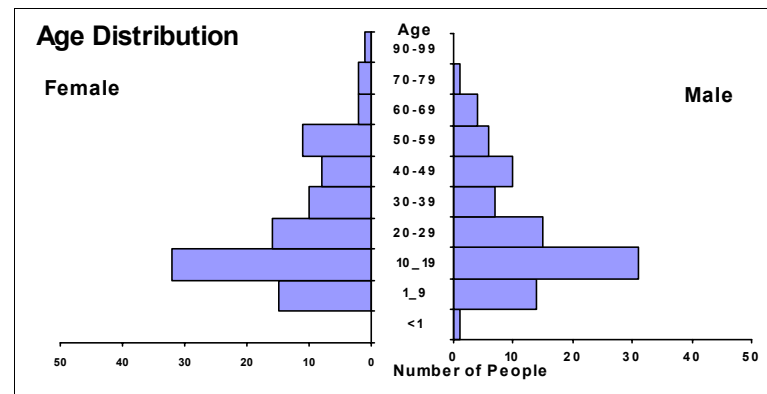
Primary Source of Drinking Water: Mountain Spring

Is the Village Supplied with Electricity: Yes

Completed Primary School (%): 67

Completed Secondary School (%): 19

| Ethnicity: | Percent |
|------------|---------|
| Lao Loum | 100 |



Approximate Date The Village Commenced Mining : 1980

Mining Season: December To: June

Average Mercury Use Per Mining Household Per Year: 0 g

Predicted Village Mercury Use Per Year: 0 g

Average Gold Production Per Mining Household Per Year: 0 g

Predicted Village Gold Production Per Year: 0 g

| Households Using Mercury: | Percent |
|---------------------------|---------|
| Past: | 72 |
| Present: | 0 |
| Never: | 28 |

| Households Engaged in Mining: | Percent |
|-------------------------------|---------|
| Currently Mining: | 0 |
| Mined in Past Only: | 75 |
| Never Mined: | 25 |

Appendix 3: Village Profiles

Village : Ban Thinhong

UNIDO: Global Mercury Project

District: Chomphet **River:** Mekong

Village Population: 383 **Male:** No Data **Female:** No Data
No. of Households: 68 **Average Household Size:** 6.1 **No. of Surveyed Households:** 30

| <i>Occupation of Sample Population</i> | <i>Percent</i> |
|--|----------------|
| Agriculture | 44 |
| Handicraft | 2 |
| Textiles | 4 |
| Salesperson | 1 |
| Teacher | 1 |
| Office Clerk | 3 |
| Manual Labour | 1 |
| Transport | 1 |
| Government Official | 1 |
| Retired / Sick/ Too Old | 2 |
| Others | 4 |
| Too Young | 38 |

| <i>Most Significant Sickness in Past 12 Months</i> | <i>Percent</i> |
|--|----------------|
| None | 58 |
| Malaria | 14 |
| Other | 12 |
| ARI | 9 |
| Diarrhoea | 3 |
| Abdominal pain | 3 |

| <i>Food Group:</i> | <i>Average Frequency of Consumption per Week</i> |
|--------------------|--|
| Chicken/duck | 2 |
| Eggs | 6 |
| Fish | 6 |
| Fruits | 6 |
| Other | 0 |
| Other aquatic food | 1 |
| Red meat | 5 |
| Rice | 21 |
| Vegetables | 10 |

Average Annual Household Income: US\$ 532 5,586,667 Kip

Health Facilities in the Village: Dispensary

Mortality Rate: 27 (death/1000 persons/year)

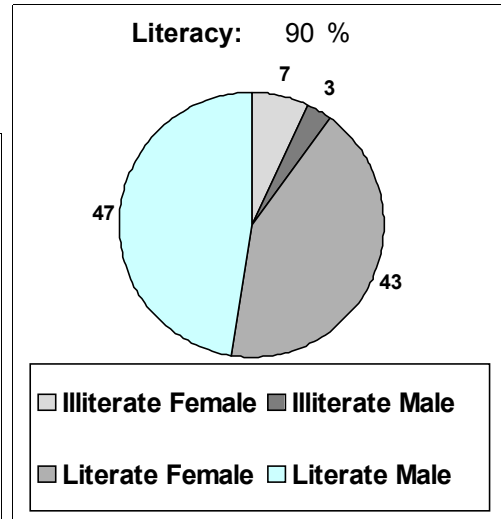
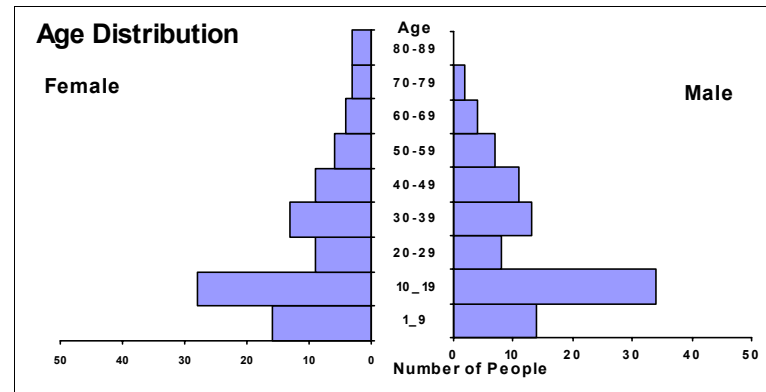
Primary Source of Drinking Water: Houay Hong Stream

Is the Village Supplied with Electricity: No

Completed Primary School (%): 61

Completed Secondary School (%): 10

| <i>Ethnicity:</i> | <i>Percent</i> |
|-------------------|----------------|
| Lao Loum | 100 |



Approximate Date The Village Commenced Mining : 1985

Mining Season: March To: April

Average Mercury Use Per Mining Household Per Year: 0 g

Predicted Village Mercury Use Per Year: 0 g

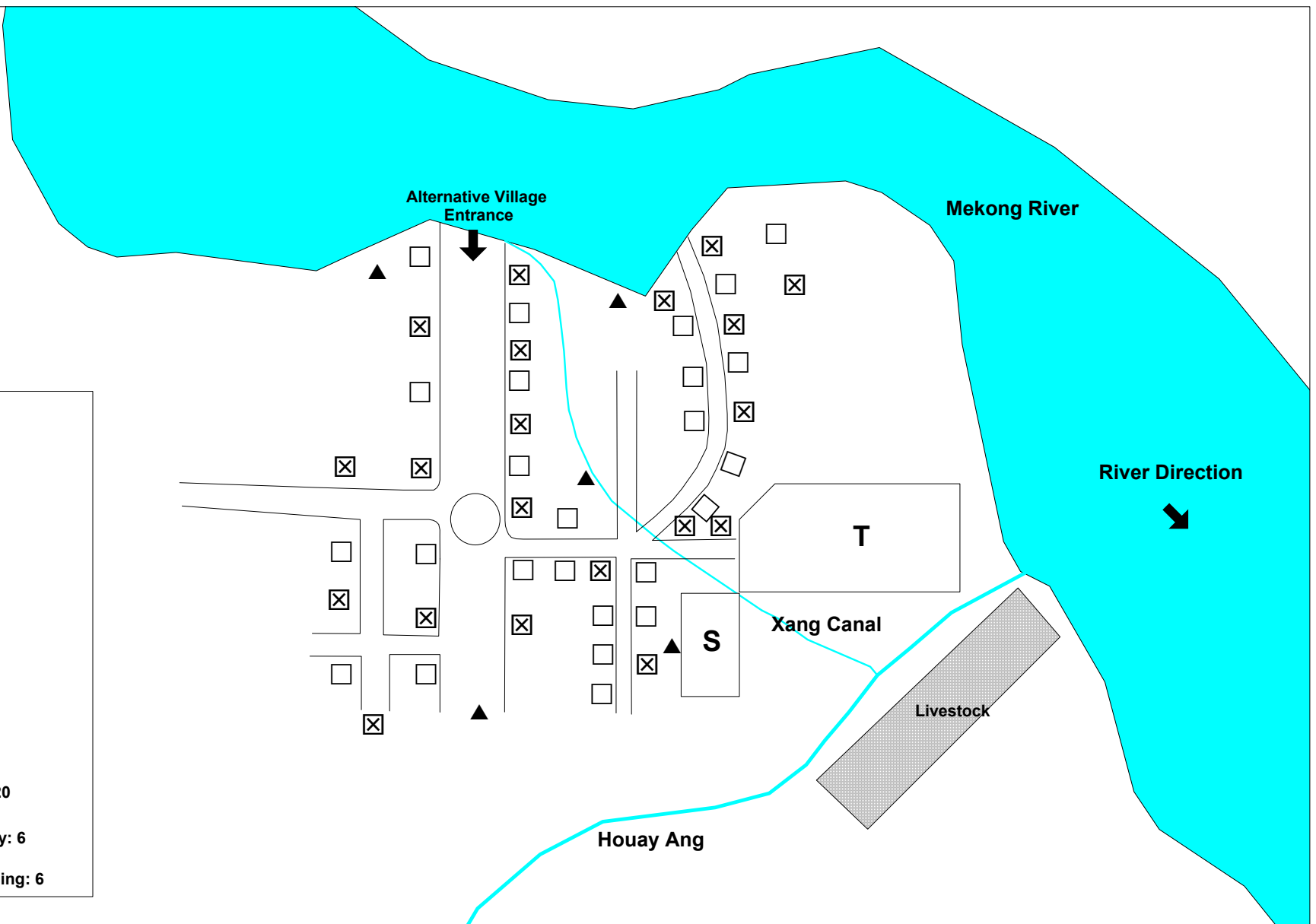
Average Gold Production Per Mining Household Per Year: 0 g

Predicted Village Gold Production Per Year: 0 g


| <i>Households Using Mercury:</i> | <i>Percent</i> |
|----------------------------------|----------------|
| Past: | 93 |
| Present: | 0 |
| Never: | 7 |

| <i>Households Engaged in Mining:</i> | <i>Percent</i> |
|--------------------------------------|----------------|
| Currently Mining: | 0 |
| Mined in Past Only: | 93 |
| Never Mined: | 7 |

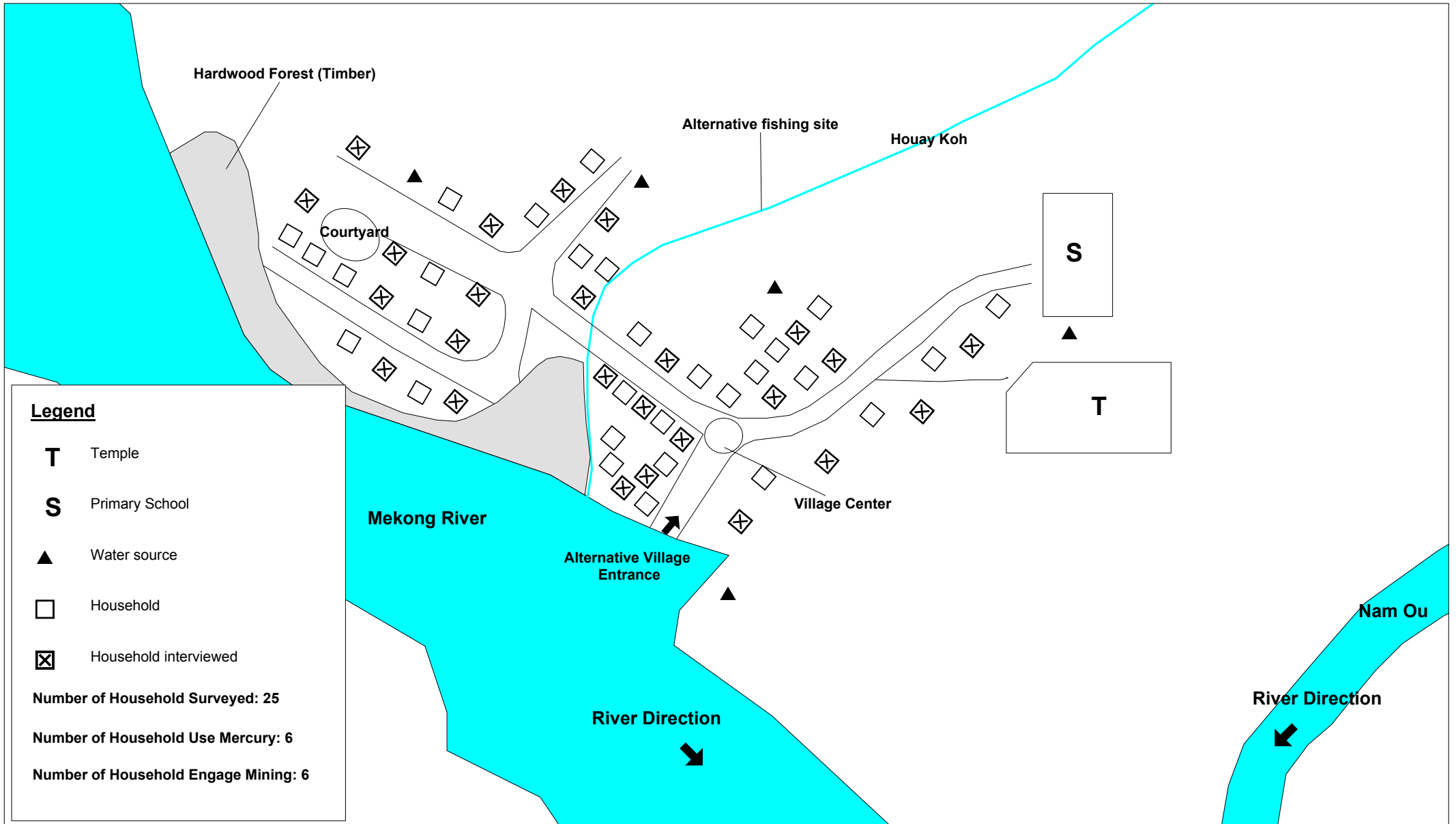
Appendix 4. Village Maps



Projection: UTM Zone 48
Datum: WGS84

| | |
|---------------|--|
| Prepared by: |  EARTH SYSTEMS LAO |
| Project Name: | Global Mercury Project |
| Date: | 28 August 2003 |
| File: | NamOu_B_Houayngno.Wor |

| |
|--|
| UNIDO |
| Appendix 4: Houayngno Village Map |




Legend

- T** Temple
- S** Primary School
- ▲** Water source
- Household
- ⊗** Household interviewed

Number of Household Surveyed: 25
 Number of Household Use Mercury: 6
 Number of Household Engage Mining: 6

N
 ↑

**Projection: UTM Zone 48
 Datum: WGS84**

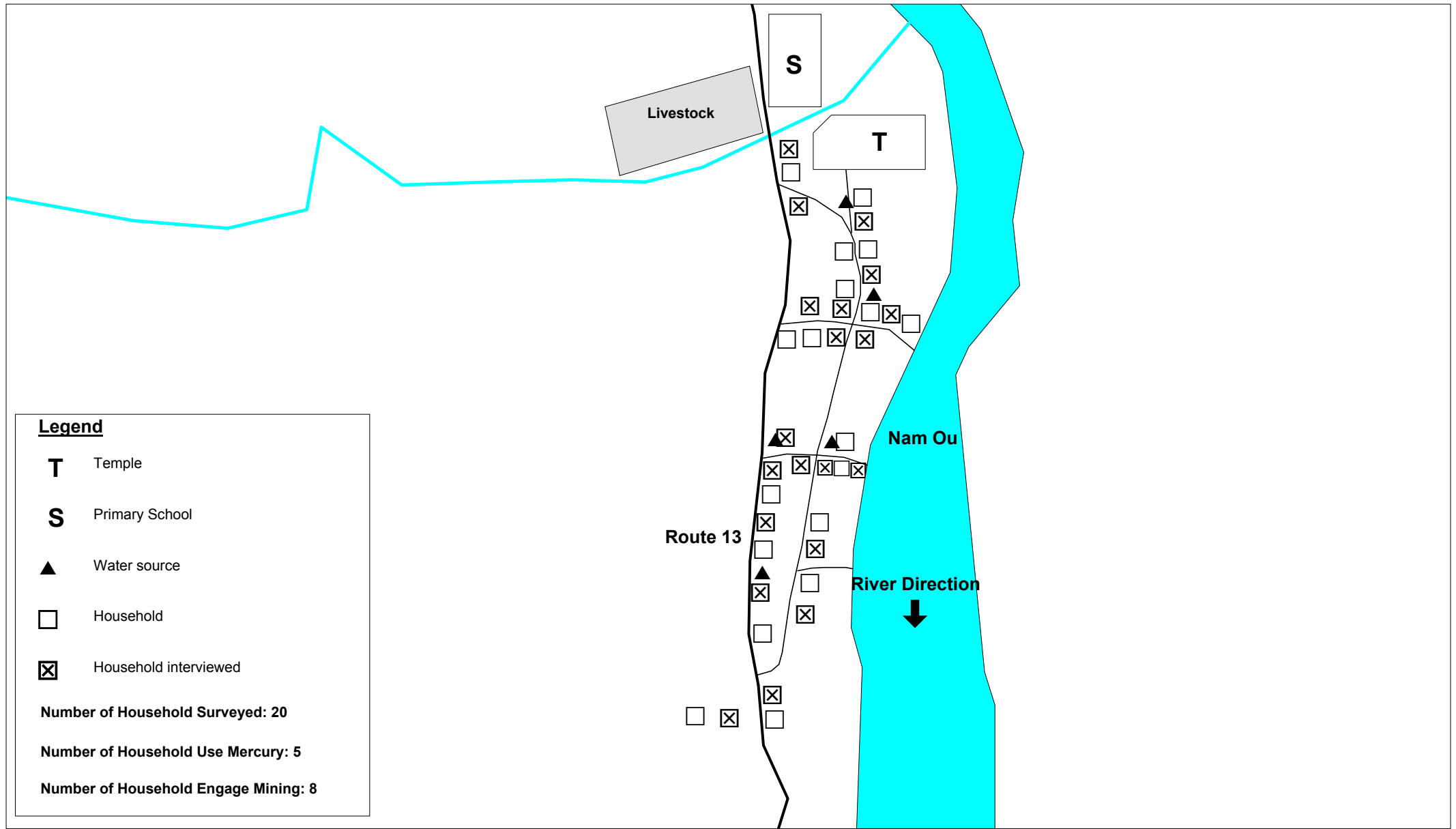
Prepared by:  **EARTH SYSTEMS LAO**

Project Name:
Global Mercury Project

Date: 28 August 2003
 File: NamOu_B_HouayKoh.Wor


UNIDO

**Appendix 4:
 Houay Koh Village Map**



N

Projection: UTM Zone 48
Datum: WGS84

Prepared by:  **EARTH SYSTEMS LAO**

Project Name:
Global Mercury Project

Date: 28 August 2003

File: NamOu_B_Houaylo.Wor

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Appendix 4:
Houaylo Village Map

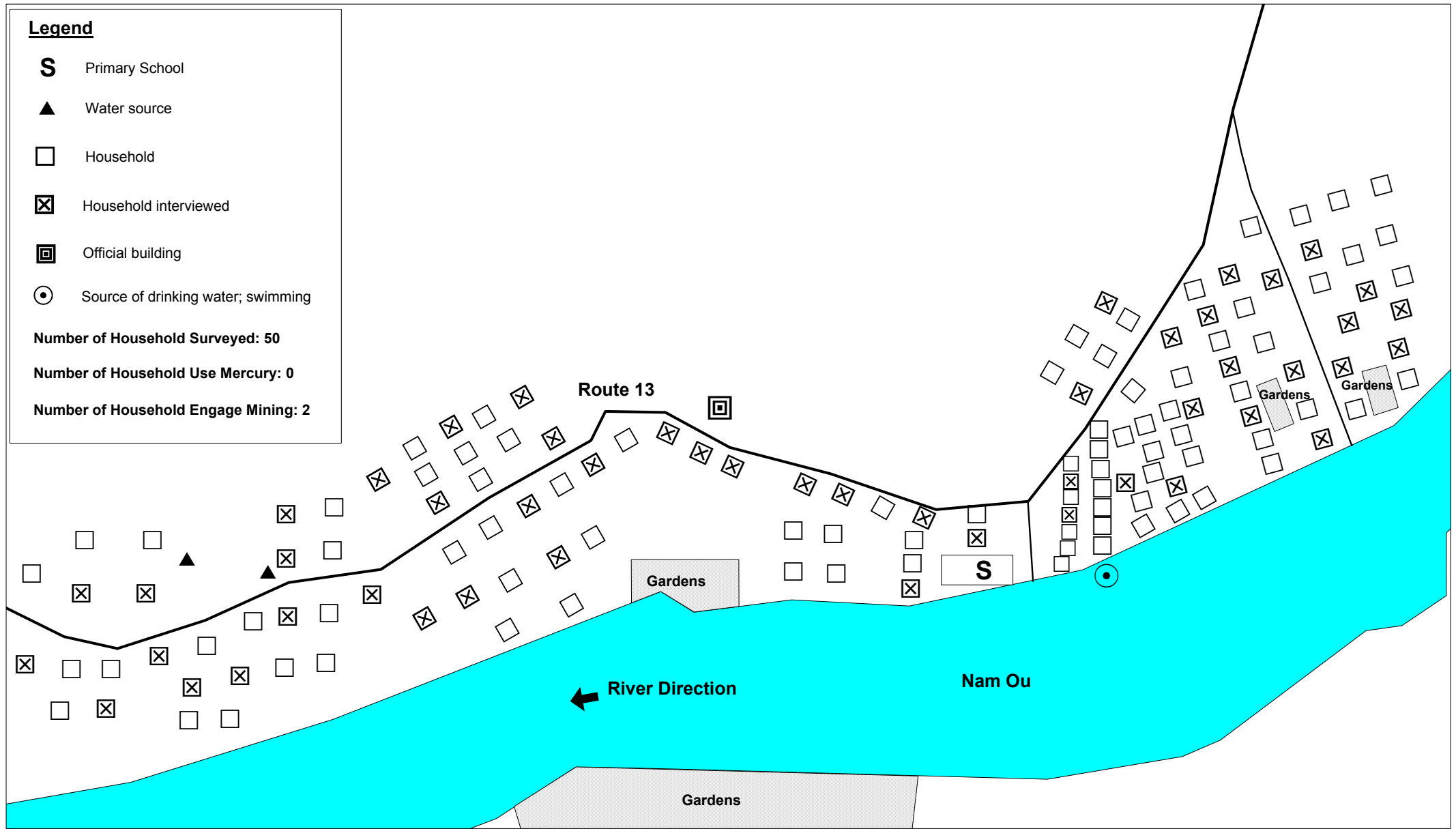
Legend

- S** Primary School
- ▲** Water source
- Household
- ⊗** Household interviewed
- ▣** Official building
- ⊙** Source of drinking water; swimming

Number of Household Surveyed: 50


Number of Household Use Mercury: 0

Number of Household Engage Mining: 2



N

Projection: UTM Zone 48
Datum: WGS84

Prepared by:  **EARTH SYSTEMS LAO**

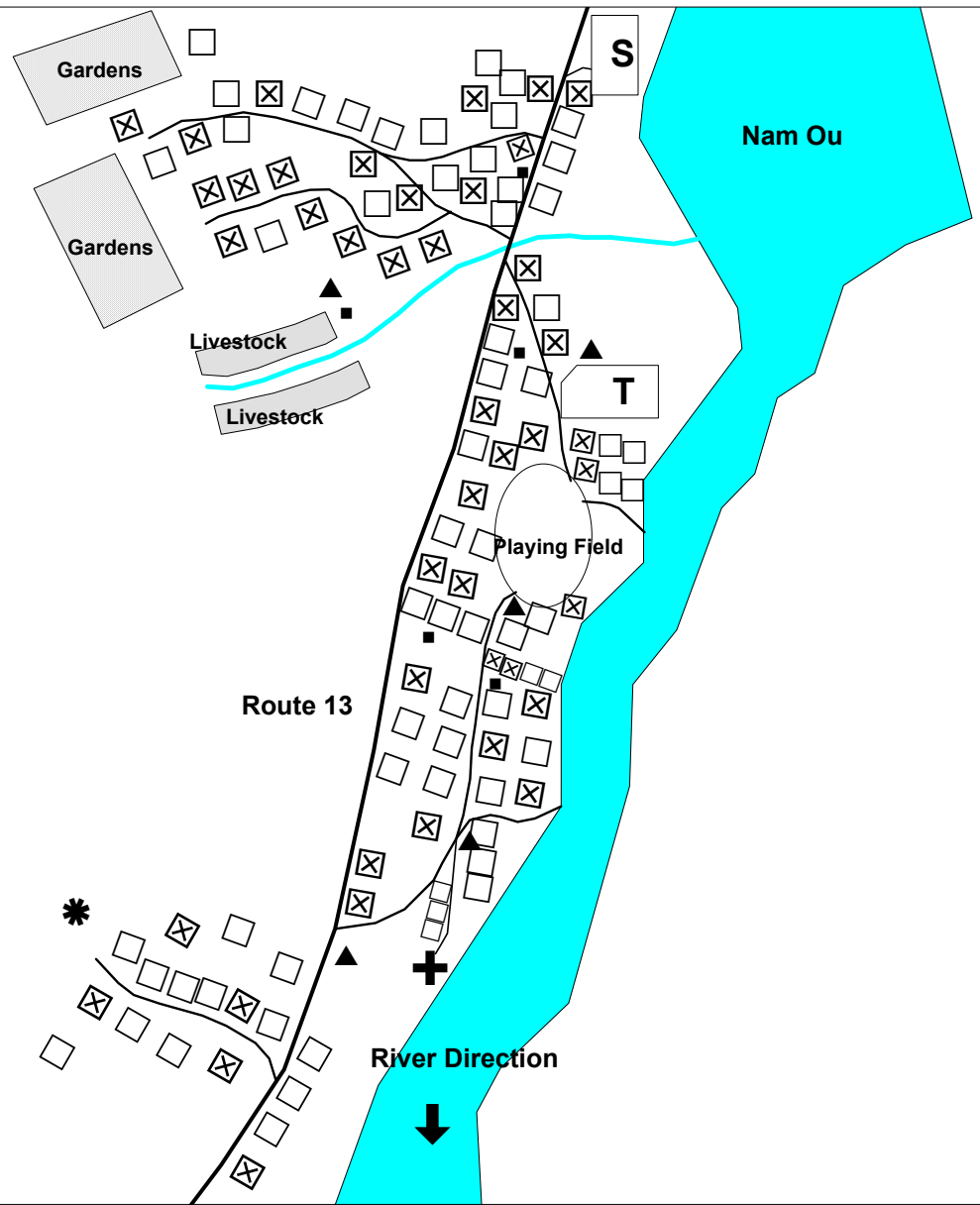
Project Name:
Global Mercury Project

Date: 28 August 2003

File: NamOu_B_Kiad.Wor

UNIDO

Appendix 4:
Kiad Village Map



Legend

- T** Temple
- S** Primary School
- ▲** Water source
- Household
- ☒** Household interviewed
- +** Health Center
- *** Mountain spring
- Rice mill

Number of Household Surveyed: 45

Number of Household Use Mercury: 10

Number of Household Engage Mining: 34



**Projection: UTM Zone 48
Datum: WGS84**

Prepared by:



EARTH SYSTEMS LAO

Project Name:

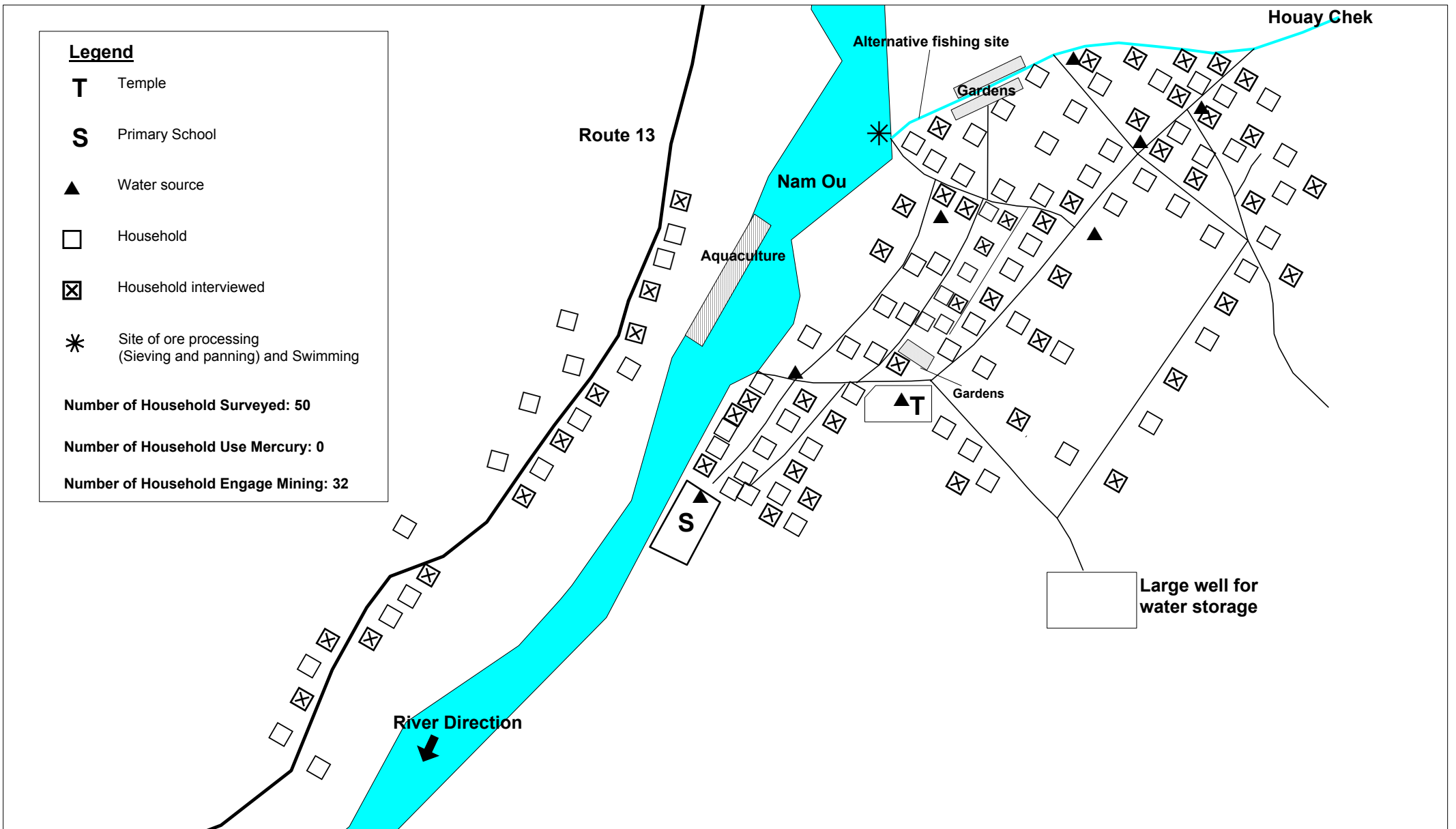
Global Mercury Project

Date: 28 August 2003

File: NamOu_B_Latthahai.Wor

UNIDO

**Appendix 4:
Latthahai Village Map**




Legend

- T** Temple
- S** Primary School
- ▲** Water source
- Household
- ⊠** Household interviewed
- *** Site of ore processing (Sieving and panning) and Swimming

Number of Household Surveyed: 50
 Number of Household Use Mercury: 0
 Number of Household Engage Mining: 32

N

 Projection: UTM Zone 48
 Datum: WGS84

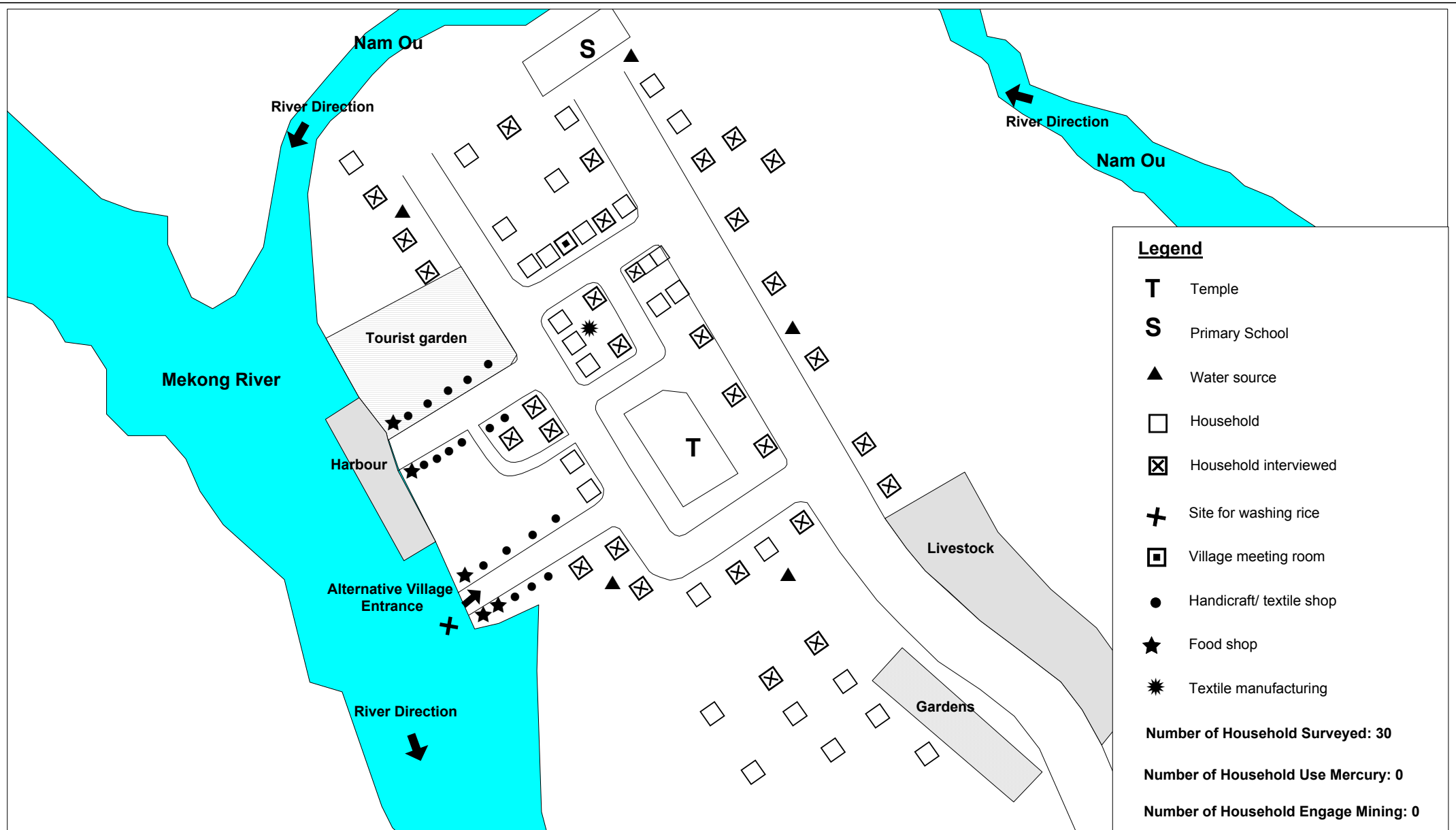
Prepared by:  **EARTH SYSTEMS LAO**

Project Name:
Global Mercury Project

Date: 28 August 2003
 File: NamOu_B_PakChek.Wor

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**Appendix 4:
 Pak Chek Village Map**



Projection: UTM Zone 48
 Datum: WGS84

Prepared by:  **EARTH SYSTEMS LAO**

Project Name:
Global Mercury Project

Date: 28 August 2003
 File: NamOu_B_PakOu.Wor

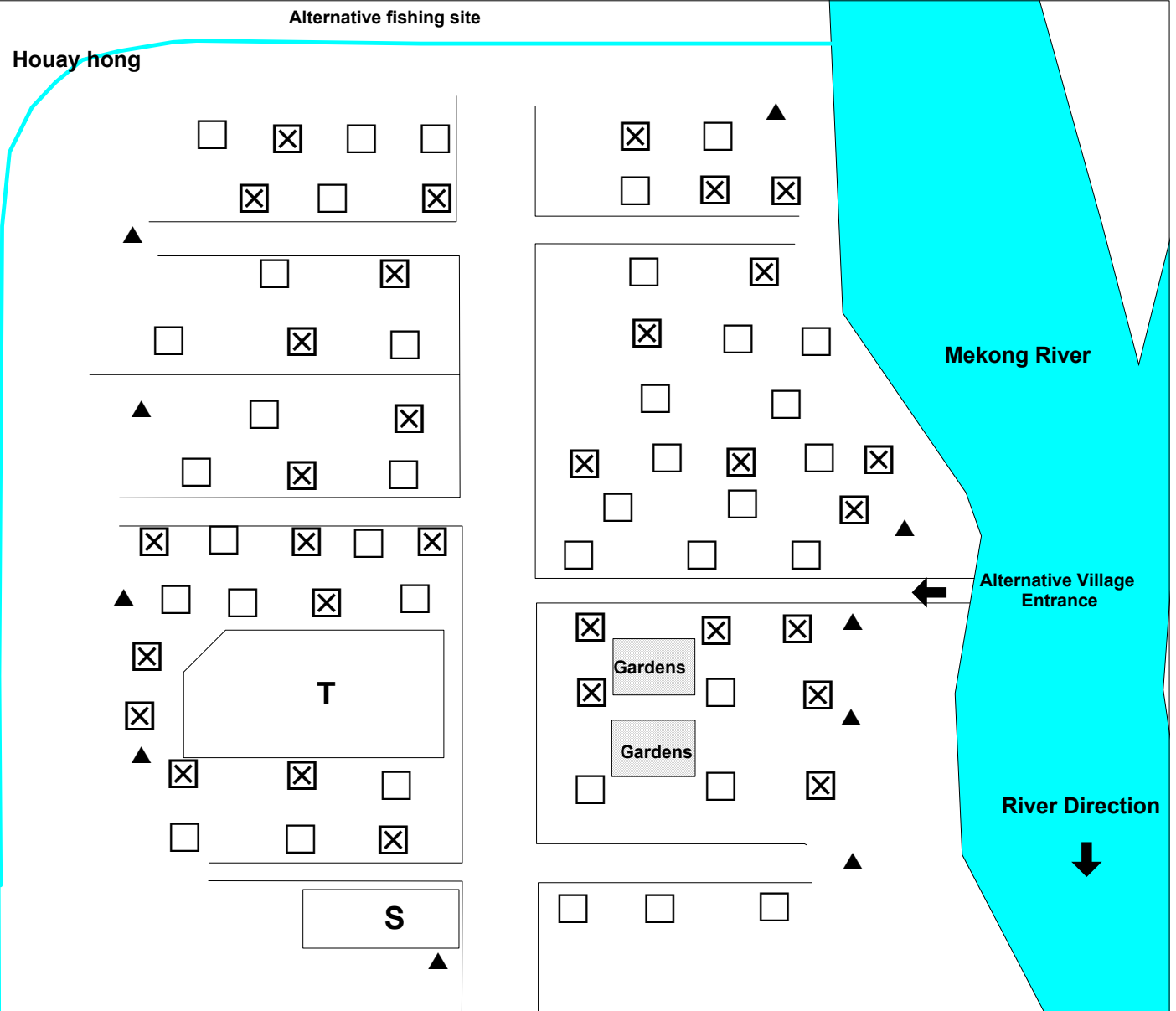
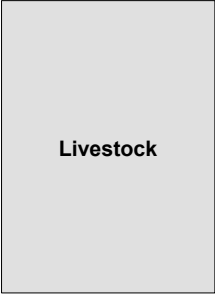
UNIDO

**Appendix 4:
 Pak Ou Village Map**

Legend

- T** Temple
- S** Primary School
- ▲** Water source
- Household
- ☒** Household interviewed

Number of Household Surveyed: 30
 Number of Household Use Mercury: 0
 Number of Household Engage Mining: 0



N

 Projection: UTM Zone 48
 Datum: WGS84

Prepared by: **EARTH SYSTEMS LAO**
 Project Name:
Global Mercury Project
 Date: 28 August 2003
 File: NamOu_B_Thinong.Wor

UNIDO
**Appendix 4:
 Thinhong Village Map**

Appendix 5. Health Study Volunteers

Appendix 5

| Name (Lao) | Name (English) | Village | Mining Activity | Mercury Use |
|----------------------------|----------------------------|-------------|--------------------|-------------|
| 1/ ນາງ ແປງ | Mrs. Peng | Ban Pakchek | Continue to Mine | Never |
| 2/ ນາງ ຝັນ ຈັນທະວົງ | Mrs. Farn Chanthavong | Ban Pakchek | Continue to Mine | Never |
| 3/ ນາງ ຈັນດາ | Mrs. Chanda | Ban Pakchek | Mined in Past Only | Never |
| 4/ ນາງ ບຸນໜຽວ ສຸວິພອນ | Mrs. Bounneo Souviphone | Ban Pakchek | Continue to Mine | Never |
| 5/ ນາງ ແກ້ວຈັນ | Mrs. Keochan | Ban Pakchek | Continue to Mine | Never |
| 6/ ນາງ ອຸນແກ້ວ | Mrs. Ounkeo | Ban Pakchek | Mined in Past Only | Never |
| 7/ ນາງ ຫຼວງ | Mrs. Luang | Ban Pakchek | Have Never Mined | |
| 8/ ນາງ ໜານໜໍ່ | Mrs. Nannor | Ban Pakchek | Continue to Mine | Never |
| 9/ ນາງ ໜານປັນ | Mrs. Nanpan | Ban Pakchek | Continue to Mine | Never |
| 10/ ນາງ ທີ່ | Mrs. Thee | Ban Pakchek | Mined in Past Only | Never |
| 11/ ນາງ ໄມ່ອຸ່ນ | Mrs. Mayoun | Ban Pakchek | Mined in Past Only | Never |
| 12/ ນາງ ນິ້ງ | Mrs. Ning | Ban Pakchek | Mined in Past Only | Never |
| 13/ ນາງ ໜໍ່ແກ້ວ ຂໍວິງໄຊ | Mrs. Norkeow Khorvongxay | Ban Pakchek | Mined in Past Only | Never |
| 14/ ນາງ ຄຳມາ | Mrs. Khamma | Ban Pakchek | Continue to Mine | Never |
| 15/ ນາງ ໄມ່ແດງ | Mrs. Maideng | Ban Pakchek | Continue to Mine | Never |
| 16/ ນາງ ຍອດ | Mrs. Nhot | Ban Pakchek | Continue to Mine | Never |
| 17/ ນາງ ຈັນດາ | Mrs. Chanda | Ban Pakchek | Continue to Mine | Never |
| 18/ ນາງ ໜານຂັນ | Mrs. Nankhan | Ban Pakchek | Have Never Mined | |
| 19/ ນາງ ສາວວັນ | Mrs. Saovan | Ban Pakchek | Continue to Mine | Never |
| 20/ ນາງ ດາ | Mrs. Da | Ban Pakchek | Mined in Past Only | Never |
| 21/ ນາງ ຊຽງບາງ | Mrs. Xiengbang | Ban Pakchek | Continue to Mine | Never |
| 22/ ນາງ ຊຽງທ້າວ | Mrs. Xiengthao | Ban Pakchek | Mined in Past Only | Never |
| 23/ ນາງ ວັນດີ ສີສະຫວ່າງວິງ | Mrs. Vandy Sisavangvong | Ban Pakchek | Continue to Mine | Never |
| 24/ ນາງ ອ່ອນແກ້ມ | Mrs. Onkem | Ban Pakchek | Continue to Mine | Never |
| 25/ ນາງ ທິດມີ ມະນີວັນ | Mrs. Thitmy Manyvan | Ban Pakchek | Continue to Mine | Never |
| 26/ ນາງ ທິດແຫງ | Mrs. Thitheng | Ban Pakchek | Mined in Past Only | Never |
| 27/ ນາງ ຊຽງໃບ | Mrs. Xiengbai | Ban Pakchek | Continue to Mine | Never |
| 28/ ນາງ ໄມ່ກອງ | Mrs. Maikong | Ban Pakchek | Continue to Mine | Never |
| 29/ ນາງ ໄມ່ສົມບູນ ສິນທະວົງ | Mrs. Maisomboun Sinthavong | Ban Pakchek | Continue to Mine | Never |
| 30/ ນາງ ໜານສຽນ | Mrs. Nansian | Ban Pakchek | Continue to Mine | Never |
| 31/ ນາງ ມີ້ | Mrs. Mee | Ban Pakchek | Continue to Mine | Never |
| 32/ ນາງ ບຸນໄທ | Mrs. Bounthai | Ban Pakchek | Continue to Mine | Never |

| Name (Lao) | Name (English) | Village | Mining Activity | Mercury Use |
|--------------------------|---------------------------|--------------|--------------------|-------------|
| 33/ ນາງ ໄມ່ແດງ | Mrs. Maideng | Ban Pakchek | Continue to Mine | Never |
| 34/ ນາງ ບຸນບາງ ສິລິພອນ | Mrs. Bounbang Siliphone | Ban Pakchek | Continue to Mine | Never |
| 35/ ນາງ ໄມ່ດວງ | Mrs. Maiduang | Ban Pakchek | Continue to Mine | Never |
| 36/ ນາງ ໄມ່ໄຫຼ | Mrs. Mailai | Ban Pakchek | Continue to Mine | Never |
| 37/ ນາງ ໄມ່ຈຸ່ມ | Mrs. Maychum | Ban Pakchek | Continue to Mine | Never |
| 38/ ນາງ ໄມ່ຮຽງ | Mrs. Maihieng | Ban Pakchek | Continue to Mine | Never |
| 39/ ນາງ ໄມ່ແກ້ວ | Mrs. Maikeo | Ban Pakchek | Continue to Mine | Never |
| 40/ ນາງ ໄໝຕູ້ຍ | Mrs. Maitui | Ban Pakchek | Continue to Mine | Never |
| 41/ ນາງ ໄມ່ເສົາ | Mrs. Maisao | Ban Pakchek | Continue to Mine | Never |
| 42/ ນາງ ໄມ່ດວງໃຫຍ່ | Mrs. Maiduangyai | Ban Pakchek | Mined in Past Only | Never |
| 43/ ນາງ ຝັນ | Mrs. Fan | Ban Pakchek | Mined in Past Only | Never |
| 44/ ນາງ ຫານສອນ | Mrs. Nansone | Ban Pakchek | Continue to Mine | Never |
| 45/ ນາງ ສົມພອນ ໄຊຍະລາດ | Mrs. Somephone Xayngalath | Ban Pakchek | Mined in Past Only | Never |
| 46/ ນາງ ຫານຜາຍ | Mrs. Nanphai | Ban Pakchek | Mined in Past Only | Never |
| 47/ ນາງ ໄມ່ຫັນ | Mrs. Maithan | Ban Pakchek | Mined in Past Only | Never |
| 48/ ນາງ ອຸ່ນ | Mrs. Oun | Ban Pakchek | Mined in Past Only | Never |
| 49/ ນາງ ໄມ່ສອຍ | Mrs. Maisoi | Ban Pakchek | Continue to Mine | Never |
| 50/ ນາງ ອຸ່ນ | Mrs. Oun | Ban Pakchek | Mined in Past Only | Never |
| 51/ ນາງ ທິດແກ່ນ ເມກດາລາ | Mrs. Thitkaen Meakdala | Ban Houaygno | Mined in Past Only | Past |
| 52/ ນາງ ຊຽງຂຶ້ນ | Mrs. Xiengkheum | Ban Houaygno | Mined in Past Only | Past |
| 53/ ນາງ ມີ | Mrs. Mee | Ban Houaygno | Mined in Past Only | Past |
| 54/ ນາງ ບຸດດາ ແສງສະຫວ່າງ | Mrs. Boudda Sengsavang | Ban Houaygno | Have Never Mined | |
| 55/ ນາງ ພິລາ ຫຼັກຜະສຸກ | Mrs. Phila Lakphasouk | Ban Houaygno | Mined in Past Only | Past |
| 56/ ນາງ ພັນເພັງ | Mrs. Chanpheng | Ban Houaygno | Continue to Mine | Present |
| 57/ ນາງ ຈິງເມັງ | Mrs. Chongmenk | Ban Houaygno | Continue to Mine | Present |
| 58/ ນາງ ຮຸ່ງ | Mrs. Hung | Ban Houaygno | Have Never Mined | |
| 59/ ນາງ ຊຽງພິມມາ ມະນີຄຳ | Mrs. Xiengphomma Manikham | Ban Houaygno | Mined in Past Only | Past |
| 60/ ນາງ ຄຳຫຼ້າ ແກ້ວພິລາ | Mrs. Khamla Keophyla | Ban Houaygno | Mined in Past Only | Past |
| 61/ ນາງ ສີພັນ | Mrs. Seephan | Ban Houaygno | Mined in Past Only | Past |
| 62/ ນາງ ແຫຼ້ | Mrs. Lae | Ban Houaygno | Mined in Past Only | Past |
| 63/ ນາງ ຊາຍ ພິມມະຈັນ | Mrs. Sai Phommachan | Ban Houaygno | Mined in Past Only | Past |
| 64/ ນາງ ທີ | Mrs. Thy | Ban Houaygno | Mined in Past Only | Past |
| 65/ ນາງ ຊຽງລິງ ພັດທະສິນ | Mrs. Xienglin Phatthasin | Ban Houaygno | Continue to Mine | Present |
| 66/ ນາງ ທຸ່ມແພງ ເກດຄຳ | Mrs. Humpheng Ketkham | Ban Houaygno | Continue to Mine | Present |
| 67/ ນາງ ເພັງ | Mrs. Pheng | Ban Houaygno | Continue to Mine | Present |

| Name (Lao) | Name (English) | Village | Mining Activity | Mercury Use |
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| 68/ ນາງ ທອງພັນ | Mrs. Thongphan | Ban Houaygno | Continue to Mine | Present |
| 69/ ນາງ ທອງພັນ | Mrs. Thongphan | Ban Houaygno | Have Never Mined | |
| 70/ ນາງ ເຜີຍ | Mrs. Pheu | Ban Houaygno | Mined in Past Only | Past |
| 71/ ນາງ ຄຳໄລ ວັນນະສິດ | Mrs. Khamlai Vannasit | Ban Houay Koh | Have Never Mined | |
| 72/ ນາງ ສີພັນ | Mrs. Siphon | Ban Houay Koh | Have Never Mined | |
| 73/ ນາງ ຊຽນ | Mrs. Xien | Ban Houay Koh | Mined in Past Only | Past |
| 74/ ນາງ ຕຸ້ຍ | Mrs. Tui | Ban Houay Koh | Mined in Past Only | Past |
| 75/ ນາງ ຈັນດີ | Mrs. Chandy | Ban Houay Koh | Continue to Mine | Present |
| 76/ ນາງ ຜູຍ | Mrs. Phui | Ban Houay Koh | Continue to Mine | Present |
| 77/ ນາງ ໃບ | Mrs. Bai | Ban Houay Koh | Have Never Mined | |
| 78/ ນາງ ຈັນ | Mrs. Chan | Ban Houay Koh | Have Never Mined | |
| 79/ ນາງ ຊຽງຜູຍ | Mrs. Xiengpui | Ban Houay Koh | Have Never Mined | |
| 80/ ນາງ ຜູຍ ວັນນະສິດ | Mrs. Phui Vannasith | Ban Houay Koh | Mined in Past Only | Past |
| 81/ ນາງ ທອງດີ | Mrs. Thongdy | Ban Houay Koh | Mined in Past Only | Past |
| 82/ ນາງ ບຸນຈັນ | Mrs. Bounchan | Ban Houay Koh | Mined in Past Only | Past |
| 83/ ນາງ ແພງ | Mrs. Pheng | Ban Houay Koh | Mined in Past Only | Past |
| 84/ ນາງ ພຸດ | Mrs. Phut | Ban Houay Koh | Mined in Past Only | Past |
| 85/ ນາງ ທອງວັນ ສີຈຳປາສີ | Mrs. Thongvan Sichampasy | Ban Houay Koh | Mined in Past Only | Past |
| 86/ ນາງ ເພັງ | Mrs. Pheng | Ban Houay Koh | Have Never Mined | |
| 87/ ນາງ ສີ | Mrs. Sy | Ban Houay Koh | Continue to Mine | Present |
| 88/ ນາງ ຈັນທິ ພັນທະສິດ | Mrs. Chanthi Phanpasith | Ban Houay Koh | Mined in Past Only | Past |
| 89/ ນາງ ໄມຜູຍ | Mrs. Maipui | Ban Houay Koh | Mined in Past Only | Past |
| 90/ ນາງ ຊຽງສິມດີ ມັງຄະລະ | Mrs. Xiengsomedy Mangkala | Ban Houay Koh | Mined in Past Only | Past |
| 91/ ນາງ ບຸນທັນ | Mrs. Bounthan | Ban Houay Koh | Mined in Past Only | Past |
| 92/ ນາງ ຊຽງຫຼ້າ | Mrs. Xiengla | Ban Houay Koh | Have Never Mined | |
| 93/ ນາງ ບຸນມິ ສີອານາ | Mrs. Bounmy Syarna | Ban Houay Koh | Continue to Mine | Present |
| 94/ ນາງ ຊຽງກັນຍາ ເພັດສະໃໝ | Mrs. Xiengkannha Phetsamai | Ban Houay Koh | Continue to Mine | Present |
| 95/ ນາງ ທອງໃສ | Mrs. Thongsai | Ban Houay Koh | Continue to Mine | Present |
| 96/ ນາງ ບຸນທຽມ | Mrs. Bounthiem | Ban Kiad | Continue to Mine | Never |
| 97/ ນາງ ມີ | Mrs. Mee | Ban Kiad | Mined in Past Only | Never |
| 98/ ນາງ ທອງຈັນ | Mrs. Thongchan | Ban Kiad | Have Never Mined | |
| 99/ ນາງ ຊຽງສີພັນ | Mrs. Xiengsiphon | Ban Kiad | Mined in Past Only | Never |
| 100/ ນາງ ສີ | Mrs. See | Ban Kiad | Mined in Past Only | Never |
| 101/ ນາງ ເສັງ | Mrs. Seng | Ban Kiad | Mined in Past Only | Never |
| 102/ ນາງ ສອນ | Mrs. Sone | Ban Kiad | Have Never Mined | |

| | Name (Lao) | Name (English) | Village | Mining Activity | Mercury Use |
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| 103/ | ນາງ ນ້ອຍ | Mrs. Noi | Ban Kiad | Have Never Mined | |
| 104/ | ນາງ ຜູ້ຍ ອິນທະສຸກ | Mrs. Tui Inthasouk | Ban Kiad | Mined in Past Only | Past |
| 105/ | ນາງ ໄດ | Mrs. Dai | Ban Kiad | Have Never Mined | |
| 106/ | ນາງ ງາ ທຸມພັນ | Mrs. Nga Humphan | Ban Kiad | Mined in Past Only | Never |
| 107/ | ນາງ ສອນ | Mrs. Sone | Ban Kiad | Have Never Mined | |
| 108/ | ນາງ ທອງວັນ ຈັນທະວົງ | Mrs. Thongvan Chanthavong | Ban Kiad | Mined in Past Only | Past |
| 109/ | ນາງ ໄຊ ໄຊຍະວົງ | Mrs. Xay Xaynhavong | Ban Kiad | Have Never Mined | |
| 110/ | ນາງ ປິ່ນ | Mrs. Pin | Ban Kiad | Have Never Mined | |
| 111/ | ນາງ ອ່ອນ | Mrs. On | Ban Kiad | Have Never Mined | |
| 112/ | ນາງ ກາ | Mrs. Ka | Ban Kiad | Have Never Mined | |
| 113/ | ນາງ ຜູ້ຍ | Mrs. Tui | Ban Kiad | Mined in Past Only | Never |
| 114/ | ນາງ ບົວພັນ | Mrs. Buaphan | Ban Kiad | Have Never Mined | |
| 115/ | ນາງ ທອງຈັນ | Mrs. Thongchan | Ban Kiad | Have Never Mined | |
| 116/ | ນາງ ພູ | Mrs. Phou | Ban Kiad | Have Never Mined | |
| 117/ | ນາງ ເຫັນ | Mrs. Hen | Ban Kiad | Have Never Mined | |
| 118/ | ນາງ ຊຽງສຸກ | Mrs. Xiengsouk | Ban Kiad | Mined in Past Only | Past |
| 119/ | ນາງ ໃຈ | Mrs. Chai | Ban Kiad | Have Never Mined | |
| 120/ | ນາງ ແທງ | Mrs. Theng | Ban Kiad | Mined in Past Only | Never |
| 121/ | ນາງ ນານ | Mrs. Nan | Ban Kiad | Have Never Mined | |
| 122/ | ນາງ ປ້ອງ | Mrs. Pong | Ban Kiad | Have Never Mined | |
| 123/ | ນາງ ໃຜ | Mrs. Phai | Ban Kiad | Have Never Mined | |
| 124/ | ນາງ ພວນ | Mrs. Phuan | Ban Kiad | Mined in Past Only | Never |
| 125/ | ນາງ ຄຳ | Mrs. Kham | Ban Kiad | Mined in Past Only | Never |
| 126/ | ນາງ ແສງ | Mrs. Seng | Ban Kiad | Have Never Mined | |
| 127/ | ນາງ ຂ້ວນ | Mrs. Kuan | Ban Kiad | Have Never Mined | |
| 128/ | ນາງ ໃຈ | Mrs. Chai | Ban Kiad | Mined in Past Only | Never |
| 129/ | ນາງ ວາດ ພັນສິມພາ | Mrs. Varth Phansimpha | Ban Kiad | Mined in Past Only | Past |
| 130/ | ນາງ ຈິກ | Mrs. Chik | Ban Kiad | Have Never Mined | |
| 131/ | ນາງ ງາມ | Mrs. Ngam | Ban Kiad | Have Never Mined | |
| 132/ | ນາງ ໄຊ | Mrs. Xai | Ban Kiad | Mined in Past Only | Never |
| 133/ | ນາງ ບຸນລຽນ | Mrs. Bounlien | Ban Kiad | Have Never Mined | |
| 134/ | ນາງ ງຳ ຄຳມະນີ | Mrs. Ngum Khammany | Ban Kiad | Have Never Mined | |
| 135/ | ນາງ ຫອມ | Mrs. Hom | Ban Kiad | Have Never Mined | |
| 136/ | ນາງ ເມືອງ ນິດ | Mrs. Meung Nit | Ban Kiad | Mined in Past Only | Never |
| 137/ | ນາງ ທິດສິງ ທຸມມະປັນຍາ | Mrs. Thitsing Thummapanya | Ban Kiad | Mined in Past Only | Never |

| Name (Lao) | Name (English) | Village | Mining Activity | Mercury Use |
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| 138/ ນາງ ໄມ່ພັນ ສອນທະວົງ | Mrs. Maiphan Sonethavong | Ban Kiad | Mined in Past Only | Never |
| 139/ ນາງ ບົວລິນ ແສງສຸລິນ | Mrs. Bualin Sengsoulin | Ban Kiad | Mined in Past Only | Never |
| 140/ ນາງ ສີ | Mrs. Si | Ban Kiad | Continue to Mine | Never |
| 141/ ນາງ ທອງໃສ | Mrs. Thongsai | Ban Kiad | Mined in Past Only | Never |
| 142/ ນາງ ຄາມ | Mrs. Karn | Ban Kiad | Have Never Mined | |
| 143/ ນາງ ຈັນ | Mrs. Chan | Ban Kiad | Have Never Mined | |
| 144/ ນາງ ເມືອງ | Mrs. Mueng | Ban Kiad | Have Never Mined | |
| 145/ ນາງ ທ. ແສງ | Mrs. Seng | Ban Latthahai | Continue to Mine | Present |
| 146/ ນາງ ຫິດ | Mrs. Hote | Ban Latthahai | Continue to Mine | Never |
| 147/ ນາງ ນ່ານມາ | Mrs. Nanma | Ban Latthahai | Continue to Mine | Never |
| 148/ ນາງ ໄມ່ໄຫຼ | Mrs. Mailai | Ban Latthahai | Continue to Mine | Never |
| 149/ ນາງ ໃຈ | Mrs. Chai | Ban Latthahai | Continue to Mine | Never |
| 150/ ນາງ ຈັນ | Mrs. Chan | Ban Latthahai | Have Never Mined | |
| 151/ ນາງ ບຸນທັນ | Mrs. Bounthan | Ban Latthahai | Continue to Mine | Never |
| 152/ ນາງ ໄມ່ສຸກ | Mrs. Maisouk | Ban Latthahai | Continue to Mine | Present |
| 153/ ນາງ ຫານຕານ | Mrs. Nantan | Ban Latthahai | Continue to Mine | Never |
| 154/ ນາງ ຫິດສິມຈິດ ແກ້ວມະນີຈັນ | Mrs. Thitsomchit Keomanycha | Ban Latthahai | Continue to Mine | Never |
| 155/ ນາງ ຢອມ | Mrs. Yom | Ban Latthahai | Continue to Mine | Present |
| 156/ ນາງ ທ. ໄມ່ສິງ | Mrs. Maising | Ban Latthahai | Continue to Mine | Never |
| 157/ ນາງ ໄມ່ຈອມ | Mrs. Maichom | Ban Latthahai | Continue to Mine | Never |
| 158/ ນາງ ແອ ສີດາ | Mrs. Air Sida | Ban Latthahai | Have Never Mined | |
| 159/ ນາງ ໄຊບໍ່ | Mrs. Xaypor | Ban Latthahai | Have Never Mined | |
| 160/ ນາງ ລາວດາຈາ | Mrs. Laodacha | Ban Latthahai | Have Never Mined | |
| 161/ ນາງ ຈີ | Mrs. Chi | Ban Latthahai | Have Never Mined | |
| 162/ ນາງ ລື | Mrs. Leu | Ban Latthahai | Have Never Mined | |
| 163/ ນາງ ຜາຍໃຫຍ່ | Mrs. Phainhai | Ban Latthahai | Continue to Mine | Past |
| 164/ ນາງ ບຸນມີ | Mrs. Bounmy | Ban Latthahai | Have Never Mined | |
| 165/ ນາງ ຫານຕານໃຫຍ່ | Mrs. Nantannhai | Ban Latthahai | Continue to Mine | Never |
| 166/ ນາງ ໄມ່ແປງ | Mrs. Maipeng | Ban Latthahai | Continue to Mine | Past |
| 167/ ນາງ ຫານໃຈ | Mrs. Nanchai | Ban Latthahai | Mined in Past Only | Never |
| 168/ ນາງ ທອນ | Mrs. Thon | Ban Latthahai | Continue to Mine | Never |
| 169/ ນາງ ແສງ | Mrs. Seng | Ban Latthahai | Mined in Past Only | Past |
| 170/ ນາງ ຈັນດີ | Mrs. Chandee | Ban Latthahai | Continue to Mine | Never |
| 171/ ນາງ ຈັນ | Mrs. Chan | Ban Latthahai | Mined in Past Only | Past |
| 172/ ນາງ ເຖົາ | Mrs. Thau | Ban Latthahai | Continue to Mine | Present |

| Name (Lao) | Name (English) | Village | Mining Activity | Mercury Use |
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| 173/ ນາງ ໄມຕາ | Mrs. Maita | Ban Latthahai | Continue to Mine | Past |
| 174/ ນາງ ນໍ | Mrs. Nor | Ban Latthahai | Continue to Mine | Past |
| 175/ ນາງ ໄມຫວດ | Mrs. Maihuot | Ban Latthahai | Continue to Mine | Present |
| 176/ ນາງ ບຸນມີ ສີສຸດດາ | Mrs. Bounmy Sisuda | Ban Latthahai | Continue to Mine | Present |
| 177/ ນາງ ໄມອຸນໄຍ | Mrs. Mayounnhai | Ban Latthahai | Continue to Mine | Present |
| 178/ ນາງ ຜາຍ | Mrs. Phai | Ban Latthahai | Continue to Mine | Never |
| 179/ ນາງ ສົມພອນ ພັນທະຈິດ | Mrs. Somephone Phanthachit | Ban Latthahai | Continue to Mine | Never |
| 180/ ນາງ ສົມບູນ | Mrs. Someboun | Ban Latthahai | Continue to Mine | Present |
| 181/ ນາງ ທຳມາ | Mrs. Thamma | Ban Latthahai | Continue to Mine | Present |
| 182/ ນາງ ໄມອຸນ | Mrs. Mayoun | Ban Latthahai | Continue to Mine | Never |
| 183/ ນາງ ແປງ | Mrs. Peng | Ban Latthahai | Continue to Mine | Never |
| 184/ ນາງ ໄມ່ຢາຍ | Mrs. Maiyai | Ban Latthahai | Continue to Mine | Never |
| 185/ ນາງ ໄມ່ໝັ້ນ ຈັນທະສັກ | Mrs. Maiman Chanthasak | Ban Latthahai | Continue to Mine | Never |
| 186/ ນາງ ຄຳ | Mrs. Kham | Ban Latthahai | Continue to Mine | Never |
| 187/ ນາງ ສາ | Mrs. Sa | Ban Latthahai | Mined in Past Only | Past |
| 188/ ນາງ ໄມສິງ | Mrs. Maising | Ban Latthahai | Continue to Mine | Present |
| 189/ ນາງ ໄມເພັງຊາ | Mrs. Maiphengxa | Ban Latthahai | Continue to Mine | Never |
| 190/ ນາງ ສິວອນ | Mrs. Sivone | Ban Houaylo | Continue to Mine | Present |
| 191/ ນາງ ບຸນຍັງ ໄຊຄົມ | Mrs. Bounyang Saykhom | Ban Houaylo | Continue to Mine | Never |
| 192/ ນາງ ເກດ | Mrs. Kate | Ban Houaylo | Continue to Mine | Present |
| 193/ ນາງ ຕາ | Mrs. Ta | Ban Houaylo | Mined in Past Only | Past |
| 194/ ນາງ ຊຽງບຸນທັນ ຈັນທະວົງ | Mrs. Siengboonhan Chantavo | Ban Houaylo | Continue to Mine | Present |
| 195/ ນາງ ສີພັນ ພະຜົນໄຊ | Mrs. Siphon Phaphonexay | Ban Houaylo | Have Never Mined | |
| 196/ ນາງ ອິນ | Mrs. In | Ban Houaylo | Mined in Past Only | Past |
| 197/ ນາງ ໄມ່ແຮ ປັນຍາດິດ | Mrs. Maihair Pangnadit | Ban Houaylo | Mined in Past Only | Past |
| 198/ ນາງ ບົວໄລ | Mrs. Bualay | Ban Houaylo | Mined in Past Only | |
| 199/ ນາງ ໂດຍ | Mrs. Doy | Ban Houaylo | Mined in Past Only | Past |
| 200/ ນາງ ໄມ່ລໍ່ ປັນຍາດິດ | Mrs. Mailor Panngadit | Ban Houaylo | Mined in Past Only | Past |
| 201/ ນາງ ສີສຸໂມ ແສງຄຳຍໍ | Mrs. Sysumai Sengkhamngor | Ban Houaylo | Continue to Mine | Never |
| 202/ ນາງ ວຽງແກ້ວ ແກ້ວພູມາ | Mrs. Viengkeo Keophouma | Ban Houaylo | Continue to Mine | Never |
| 203/ ນາງ ສົມໄຊ | Mrs. Somsay | Ban Houaylo | Continue to Mine | Present |
| 204/ ນາງ ຄຳມີ ພິລາຫາ | Mrs. Khammee Pilaha | Ban Houaylo | Mined in Past Only | Past |
| 205/ ນາງ ດວງຕາ ພົມມະວົງ | Mrs. Duangta Phommavong | Ban Houaylo | Mined in Past Only | Past |
| 206/ ນາງ ສົມບູນ ສຸຂະພົນ | Mrs. Somboon Sukaponh | Ban Houaylo | Continue to Mine | Present |
| 207/ ນາງ ທິດຜາຍ | Mrs. Thitphai | Ban Houaylo | Mined in Past Only | Past |

| | Name (Lao) | Name (English) | Village | Mining Activity | Mercury Use |
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| 208/ | ນາງ ໄຫມສິນ ຟິງສະຫັວດ | Mrs. Maisinh Phongsavat | Ban Houaylo | Mined in Past Only | Never |
| 209/ | ນາງ ບຸນສຸກ ແກ້ວພິມມາ | Mrs. Bounsook keophomma | Ban Houaylo | Have Never Mined | Past |
| 210/ | ນາງ ທອງພັດ ສີສິມພັນ | Mrs. Thongphet Sisomphan | Ban Pak Ou | Mined in Past Only | Past |
| 211/ | ນາງ ວິໄລຜົນ ອ່ອນຈັນ | Mrs. Vilaypon Aonchan | Ban Pak Ou | Mined in Past Only | Past |
| 212/ | ນາງ ອູໄລວັນ ພັນດາລັກ | Mrs. Aulayvan Phandalak | Ban Pak Ou | Have Never Mined | |
| 213/ | ນາງ ອ້ອນ ຈັນທະມາໄລ | Mrs. Aon Chantamalai | Ban Pak Ou | Mined in Past Only | Past |
| 214/ | ນາງ ຈັນເພັງ | Mrs. Chanpeng | Ban Pak Ou | Mined in Past Only | Past |
| 215/ | ນາງ ຊຽງຈັນເພັງ ເພັງສິມ | Mrs. Siangchanpeng Pengsom | Ban Pak Ou | Mined in Past Only | Past |
| 216/ | ນາງ ບົວວັນ | Mrs. Buavan | Ban Pak Ou | Mined in Past Only | Past |
| 217/ | ນາງ ທິດແກ້ວ ຈັນທະພອນ | Mrs. Thitkeo Chantaphone | Ban Pak Ou | Mined in Past Only | Past |
| 218/ | ນາງ ອາລຸນ | Mrs. Arloon | Ban Pak Ou | Have Never Mined | |
| 219/ | ນາງ ບຸນແຕ້ມ ວິໄລສຸກ | Mrs. Bountaem Vilaysouk | Ban Pak Ou | Mined in Past Only | Past |
| 220/ | ນາງ ອຸ່ນເຮືອນ | Mrs. Aunhuean | Ban Pak Ou | Mined in Past Only | Past |
| 221/ | ນາງ ຈັນທອນ | Mrs. Chanthon | Ban Pak Ou | Mined in Past Only | Never |
| 222/ | ນາງ ສິມພອນ ແກ້ວສິມບຸນ | Mrs. Somphone Keosomboun | Ban Pak Ou | Mined in Past Only | Past |
| 223/ | ນາງ ຄຳພັນ ທະວົງສາ | Mrs. Khamphan Thavongsa | Ban Pak Ou | Mined in Past Only | Past |
| 224/ | ນາງ ບຸນທັນ | Mrs. Bounthan | Ban Pak Ou | Mined in Past Only | Past |
| 225/ | ນາງ ນໍລະເກດ ວິລະປັນຍາ | Mrs. Norakhet Vilaphanya | Ban Pak Ou | Have Never Mined | |
| 226/ | ນາງ ວັນລີ | Mrs. Vanli | Ban Pak Ou | Have Never Mined | |
| 227/ | ນາງ ຊຽງປານ | Mrs. Siengpanh | Ban Pak Ou | Mined in Past Only | Past |
| 228/ | ນາງ ບົວຈັນ ພິມມະຈັນ | Mrs. Buachan Phommachan | Ban Pak Ou | Mined in Past Only | Past |
| 229/ | ນາງ ຊຽງທອງວັນ | Mrs. Siengthongvan | Ban Pak Ou | Mined in Past Only | Past |
| 230/ | ນາງ ຊ.ຍາ | Mrs. Ya | Ban Pak Ou | Mined in Past Only | Past |
| 231/ | ນາງ ບຸນທັນ | Mrs. Bounthan | Ban Pak Ou | Mined in Past Only | Past |
| 232/ | ນາງ ສຳລານ ໄພຍະສັກ | Mrs. Samlan Phaiyasak | Ban Pak Ou | Mined in Past Only | Past |
| 233/ | ນາງ ສິມດີ ມະນີສະຫັວນ | Mrs. Somdee Maneesavanh | Ban Pak Ou | Mined in Past Only | Past |
| 234/ | ນາງ ຊຽງບຸນທັນ ພິມມະລັງສີ | Mrs. Siengbounthan Phommal | Ban Pak Ou | Mined in Past Only | Past |
| 235/ | ນາງ ບຸນທັນ | Mrs. Bounthan | Ban Pak Ou | Mined in Past Only | Past |
| 236/ | ນາງ ຄຳເຫຼັດ ພັນດາລັກ | Mrs. Khamlet Phandaluke | Ban Pak Ou | Have Never Mined | |
| 237/ | ນາງ ສີສຸພັນ | Mrs. Sisuphan | Ban Pak Ou | Have Never Mined | |
| 238/ | ນາງ ສາວຄຳຜູ | Mrs. Saokhampou | Ban Pak Ou | Mined in Past Only | Past |
| 239/ | ນາງ ຄຳ | Mrs. Kham | Ban Pak Ou | Have Never Mined | |
| 240/ | ນາງ ຄຳຮຸ່ງ ທອງສະຫງວນ | Mrs. Khamhung Thongsangua | Ban Pak Ou | Have Never Mined | |
| 241/ | ນາງ ສິມພິ | Mrs. Sommee | Ban Pak Ou | Mined in Past Only | Past |
| 242/ | ນາງ ຊຽງມີ | Mrs. Siengmee | Ban Thinhong | Mined in Past Only | Past |

| | Name (Lao) | Name (English) | Village | Mining Activity | Mercury Use |
|------|----------------------------|-----------------------------|----------------|------------------------|--------------------|
| 243/ | ນາງ ຊ.ຄຳຕາ ພອນລັດສະໝີ | Mrs. Khamta Phonesamai | Ban Thinhong | Mined in Past Only | Past |
| 244/ | ນາງ ຈັນເພັງ ແສງຈັນ | Mrs. Chanpeung Sengchan | Ban Thinhong | Mined in Past Only | Past |
| 245/ | ນາງ ສຸກ ຜົນປະເສີດ | Mrs. Souk Ponhpasert | Ban Thinhong | Mined in Past Only | Past |
| 246/ | ນາງ ບົວ ອິນທະນາໄລ | Mrs. Bua Inthanalai | Ban Thinhong | Mined in Past Only | Past |
| 247/ | ນາງ ພອນ | Mrs. Phone | Ban Thinhong | Mined in Past Only | Past |
| 248/ | ນາງ ຊຽງສິງຄຳ ມະນີວິງ | Mrs. Siengsingkham Maneevo | Ban Thinhong | Mined in Past Only | Past |
| 249/ | ນາງ ບຸນ | Mrs. Boun | Ban Thinhong | Mined in Past Only | Past |
| 250/ | ນາງ ບຸນເໝີ ຈິດຕະພອນ | Mrs. Bounnure Chintaphone | Ban Thinhong | Mined in Past Only | Past |
| 251/ | ນາງ ຈັນທອນ ພອນລັດສະໝີ | Mrs. Chanthon Phonelatsame | Ban Thinhong | Mined in Past Only | Past |
| 252/ | ນາງ ສົມຈັນ ດວງພະຈັນ | Mrs. Somchan Daungpachan | Ban Thinhong | Mined in Past Only | Past |
| 253/ | ນາງ ບົວລາ | Mrs. Buala | Ban Thinhong | Mined in Past Only | Past |
| 254/ | ນາງ ທຸມແພງ ອິນທະນາໄລ | Mrs. Houmpeng Inthanalai | Ban Thinhong | Mined in Past Only | Past |
| 255/ | ນາງ ຈັນສຸກ ສຸພັດທອນ | Mrs. Chansouk Souphatthon | Ban Thinhong | Mined in Past Only | Past |
| 256/ | ນາງ ອຳພອນ | Mrs. Aumphone | Ban Thinhong | Mined in Past Only | Past |
| 257/ | ນາງ ຜາບແພງ | Mrs. Habepeng | Ban Thinhong | Have Never Mined | |
| 258/ | ນາງ ຊຽງແກ່ນຈັນ | Mrs. Siengkenchan | Ban Thinhong | Mined in Past Only | Past |
| 259/ | ນາງ ທິດອຸ່ນເຮືອນ ພິງສະຫັວນ | Mrs. Thitounheun Pongsavanh | Ban Thinhong | Mined in Past Only | Past |
| 260/ | ນາງ ຊຽງສຸກ ບຸນຍອດ | Mrs. Siengsouk Bounyot | Ban Thinhong | Mined in Past Only | Past |
| 261/ | ນາງ ເພັງ | Mrs. Pueng | Ban Thinhong | Mined in Past Only | Past |
| 262/ | ນາງ ກູດ ທອງລິດ | Mrs. Kout Thonglit | Ban Thinhong | Mined in Past Only | Past |
| 263/ | ນາງ ທອງຂຶ້ນ ບຸນສະຫັວນ | Mrs. Thongkeum Bounsavat | Ban Thinhong | Mined in Past Only | Past |
| 264/ | ນາງ ບຸນທຽມ ມໍລະເດດ | Mrs. Bountiem Moradet | Ban Thinhong | Mined in Past Only | Past |
| 265/ | ນາງ ປຽງ ວຽງແກ້ວ | Mrs. Pieng Viengkeo | Ban Thinhong | Have Never Mined | |
| 266/ | ນາງ ສີສຸມັງ ຈິດຕະພິງ | Mrs. Sisumang Chintapong | Ban Thinhong | Mined in Past Only | Past |
| 267/ | ນາງ ທອງຄູນ ວຽງແກ້ວ | Mrs. Thongkoun Viengkeo | Ban Thinhong | Mined in Past Only | Past |
| 268/ | ນາງ ບົວໃສ່ ຊຸນວິງແກ້ວ | Mrs. Buasay Kounvongkeo | Ban Thinhong | Mined in Past Only | Past |
| 269/ | ນາງ ສົມລິດ ວິງທະນູ | Mrs. Somlit Vongtanou | Ban Thinhong | Mined in Past Only | Past |
| 270/ | ນາງ ແກນຈັນ ມະນີຈັນ | Mrs. Khanchan Maneechan | Ban Thinhong | Mined in Past Only | Past |
| 271/ | ນາງ ຄຳຫຼ້າ ມະນີສຸກ | Mrs. Khamla Maneesouk | Ban Thinhong | Mined in Past Only | Past |

Appendix 6. Terms of Reference

Removal of Barriers to the Introduction of Cleaner Artisanal Gold Mining and Extraction Technologies

JOB DESCRIPTION

EG/GLO/01/G34/17-15

Post Title: National WID Expert/Sociologist

Duration: 2.0 w/ms

Date required: ASAP

Duty Station: Vientiane and selected small-scale mining sites, Lao PDR

Counterpart: Country Ministries/Institutions responsible for mining, environment and health.

Duties: Under the direction of the Project Manager/Chief Technical Adviser and in cooperation with Country Focal Points (CFP), the expert will be responsible for the following duties.

During the field assignment the Expert on sociological studies has to collect sufficient data and knowledge of the structure and demography of the population living at the selected site. Information should be collected on the type of occupations of this population. If possible, estimates should be made on the gold output. Food composition and eating habits are of particular interest. The Expert should provide a detailed description of the small-scale mining community living at the selected site with detailed data on number of people, sex, age, occupational activities other than mining, location of households, duration of time they spent at the selected site, duration of time working as small-scale gold miners, ethnic origin. Furthermore a detailed description of the overall process of gold production should be provided with focus on the use of mercury and the evaporation of the toxic metal as well as the locations where the burning of the amalgam occurs.

At the selected site, data on the following issues should be collected: number of males, females, children, and distribution of ages. The expert should describe the type of habitat: How many households? How many people per household (mean)? The Expert has to describe furthermore the ethnic diversity, education system, such as local schools, school levels, and number of pupils. The report of the Expert should also focus on infrastructure, such as drinking water distribution, health facilities, market. Activities linked to gold production (mercury seller, gold trader...), farming, trading should be sufficiently described.

Regarding environment and diet issues, the following information is essential: kind of food, proportion local products (meat, fish, vegetables). Information on water should include borehole distribution, accessibility and quality. Regarding river water use, information on irrigation, fishing, washing, use for drinking purposes should be provided. Additionally, the type of agriculture and husbandry should be analyzed.

| Main duties | m/m | Location | Expected Results | Related Activities |
|--|------------|---|---|---|
| Determine mortality, age and gender distribution, duration of mercury exposure and other important features of the mining community under investigation (vide above). Identify approx. 250 volunteers for the health study | 0.4 | Selected small-scale mining sites | Critical study on social context of affected population | none |
| Check habitat, proximity to extraction activities and find out possible ways of exposure. Assess community awareness of the mercury problem | 0.4 | Selected small-scale mining sites | Empirical research on understanding of the impact of mercury | none |
| Check occupational hygiene and dietary habits. Refine questionnaire according to the needs. | 0.1 | Selected small-scale mining sites | Develop a critical enquiry on exposure to mercury | none |
| Meet representatives of women's associations to discuss the status and situation of women engaged in gold mining, share of women and their contribution to the incomes of the households, type of work they are carrying out in the mining process and their working conditions. | 0.2 | Selected small-scale mining sites and Vientiane | Full understanding of women involvement in small-scale gold mining | none |
| Prepare recommendations to the project management on how the project can better address women's problems and can better integrate them into the mining activities they are involved in. | 0.1 | Selected small-scale mining sites and Vientiane | Proposal on better integration of women in the sector | none |
| Prepare a 50 pages report in English excluding annexes on data collection. | 0.3 | Home-based | Enhanced understanding of public environmental concern for mercury and assessing environmental and social impacts | Draw conclusions in cooperation with local Health Service |

Qualifications: Sociologist with a Diploma or university degree in Social Sciences, experience in training of local women and experience in SME.

Language: English and local language.

BACKGROUND INFORMATION:

Mercury is one of the most toxic substances in the world causing significant damage to the environment and to the health of the people who handle it. Mercury, which is used mostly by artisanal gold miners is absorbed by the human organism through drinking water, food or breathed air. Artisanal mining activities provide income to the world's poorest populations and ethnic minorities; a great majority of the miners being women and children. For every gram of gold recovered about two grams of mercury are released into the environment – often resulting in the death of men, women and children and in a permanently ruined habitat. The relevant simplicity and effectiveness of the technology, known as amalgamation, mask its dangers. This process can be improved with procedures using inexpensive and highly efficient devices that can be manufactured locally at a low cost.

The objective of the programme is to replace mercury amalgamation with new technology while improving the income of the miners through more efficient recovery, increasing knowledge and awareness and providing policy advice on the regulation of artisanal gold mining with due consideration for gender issues.

The primary target beneficiaries will be artisanal miners – men and women alike. The secondary beneficiaries will be governments, local institutions and the society at large due to the very nature and extent of the damage caused by artisanal mining.

The activities will mainly be directed towards the introduction of safe and high-yield extraction methods that could pre-empt the use of mercury – i.e. introduction of new technology and its dissemination; training of miners in the application of new technology, training of local manufacturers, awareness creation on the protection of the environment as well as policy advice to governments and local institutions.