

## Small-scale mining in Mongolia

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## Commodities mined by small-scale miners in Mongolia

Production of various minerals and metals by small scale miners  
 (from Noetstaller, 1995 Important commodities in Mongolia (in yellow))

Metals	% mined	Industrial minerals	% mined
Beryllium	100	Fluorite	90
Mercury	90	Graphite	90
Tungsten	80	Talc	90
Chromium	50	Vermiculite	90
Antimony	45	Pumice	90
Manganese	18	Feldspar	80
Tin	15	Clay	75
Iron	12	Gypsum	70
Lead	11	Barite	60
Zinc	11	Sand and gravel	30
Cobalt	10	Dimension stones	30
Gold	10	Salt	20
Silver	10	Coal	20
Copper	8	Phosphate	10



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## Types of small-scale mining for gold

- Placer mining
- Hard rock mining



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## Dry placer mining



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## Small-scale mining of mercury



Picture from: Action research on mercury pollution in Boroo area, Mongolia. Prepared by B. Tumenbayar for Japan International Cooperation Agency Mongolia Office 2003.



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## Placer mining



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## Underground placer mining



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## Hard rock gold mining



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## Crushing and milling



5 kg mercury per 4 ton of ore is added



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## Tailings



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## Amalgamation



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## How to reduce health and environmental hazards

- Recycling of mercury
- Acid treatment



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## Recycling of mercury



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## Treatment with Nitric acid



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## Acid treatment



Very toxic fumes,  
but only toxic for  
a short time



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## Groups active in small-scale mining in Mongolia

- ILO
- World Bank
- Canadian funding
- NGO groups
- Eco-Minex



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## Two new projects suggested

- Teaching and training of medical doctors and small-scale miners in handling mercury in Mongolia
- Pilot project: Cleaning the Boroo river area for mercury



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## Teaching programme

- Teaching of small-scale miners
- Teaching of medical doctors
- Teaching of future trainers
- Teaching of village officials



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## Teaching small-scale miners



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## Teaching of medical doctors

1. General mercury toxicology
  - Physical and chemical properties of various mercury species
  - Human exposure routes, air, food, skin contact, and placental transfer
  - Distribution in the body and biochemical reactions
  - Excretion
2. Diagnostic criteria for acute and chronic mercury poisoning
3. Treatment and prevention
4. Consequences of long-time low-dose exposure
5. Risk assessment and risk management
6. International guidelines for safe exposure
7. Demonstration of sampling techniques for environmental monitoring (air) and biological monitoring (blood and urine)



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## Teaching project

**Duration of project: Two years**

**Estimated budget 150.000 US\$**



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## **Pilot project: Cleaning the Boroo River area for mercury**



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## **Background**

**In 1913 a Chinese mining company started extracting gold from hard rock using mercury**

**Mercury was stored in a tank**

**After many years the company stopped**

**In 1956 the tank exploded and 5 to 10 ton of mercury discarded**

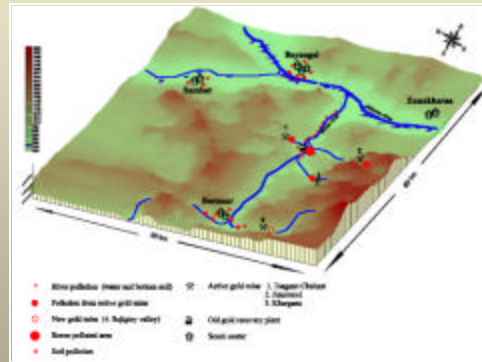


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## Boroo River area



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Picture from: Action research on mercury pollution in Boroo area, Mongolia. Prepared by B. Tumenbayar for Japan International Cooperation Agency Mongolia Office 2003.

## Mercury distribution

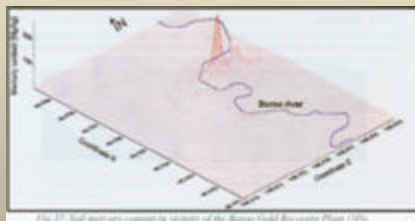


Fig. 27. Soil mercury content in vicinity of the Boroo Gold Recovery Plant (2003)

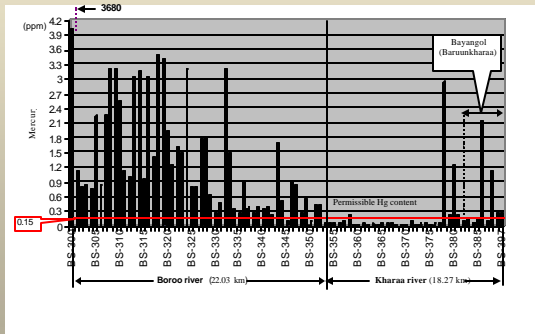


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Picture from: Action research on mercury pollution in Boroo area, Mongolia. Prepared by B. Tumenbayar for Japan International Cooperation Agency Mongolia Office 2003.

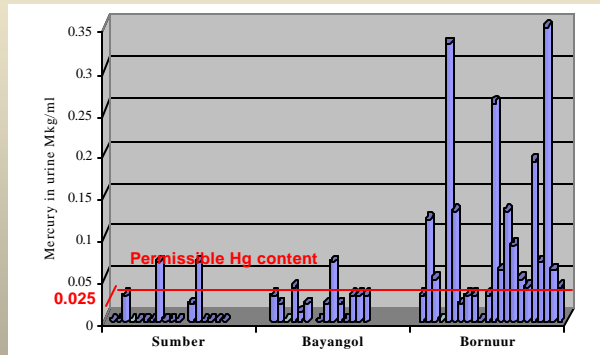
## Mercury in river sediments



Picture from: Action research on mercury pollution in Boro area, Mongolia. Prepared by B. Tumenbayar for Japan International Cooperation Agency Mongolia Office 2003.



## Mercury in urine



Picture from: Action research on mercury pollution in Boro area, Mongolia. Prepared by B. Tumenbayar for Japan International Cooperation Agency Mongolia Office 2003.



# Rescue plan

## Pilot project

- Clean the soil in a 20 by 20 meter large area down to about 2 meters depth

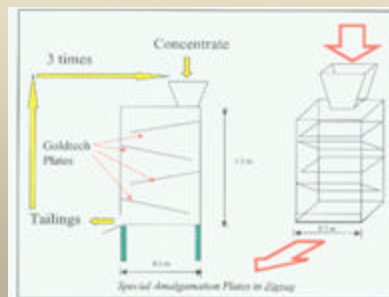


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# Cleaning of soil



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## Pilot project

**Duration: 2 to 3 months**

- Test sampling and analysing for Mercury
- Treatment of about 800 m<sup>3</sup> soil
- Test sampling after clean-up

**Budget: 150.000 US\$**



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