

Oral bioaccessibility of potentially toxic elements in stream- and terrace- sediments affected by mining activities, Remance gold mine (Panama)

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INTRODUCTION – The Remance mine



Gold mine, Remance, Veraguas, Panamá

- The gold-related hydrothermal alteration covers an area of 10 km².
- The last company used **cyanidation process** to extract the precious metals, between 1989 and 1999.
- Previous studies have reported that stream and terrace sediments are severely polluted and represented a serious ecological risk by the presence of high concentrations of potentially toxic elements.
- The carcinogenic and non-carcinogenic risk assessment was exceeded for children into a recreational setting in areas of major mining activity; and for adults, the carcinogenic risk is also exceeded mainly by the ingestion route.

Objective:

- The objective of this study has been to determine the oral bioaccessibility of PTEs in terrace sediments and stream sediments to evaluate the health risks that these materials represent in case of accidental ingestion in a recreational setting.



METHODOLOGY

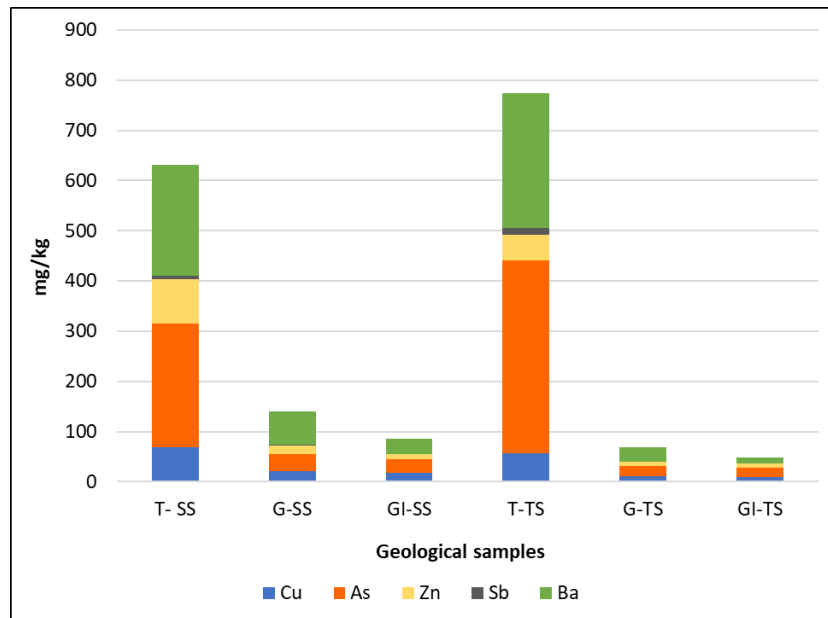
The PTEs Cu, As, Zn, Sb and Ba were determined in the pseudo-total fraction by ICP-OES.

The oral bioaccessibility test was performed by the **UBM method** and the concentrations of the PTEs in the gastric and gastrointestinal phase were determined by ICP-OES.

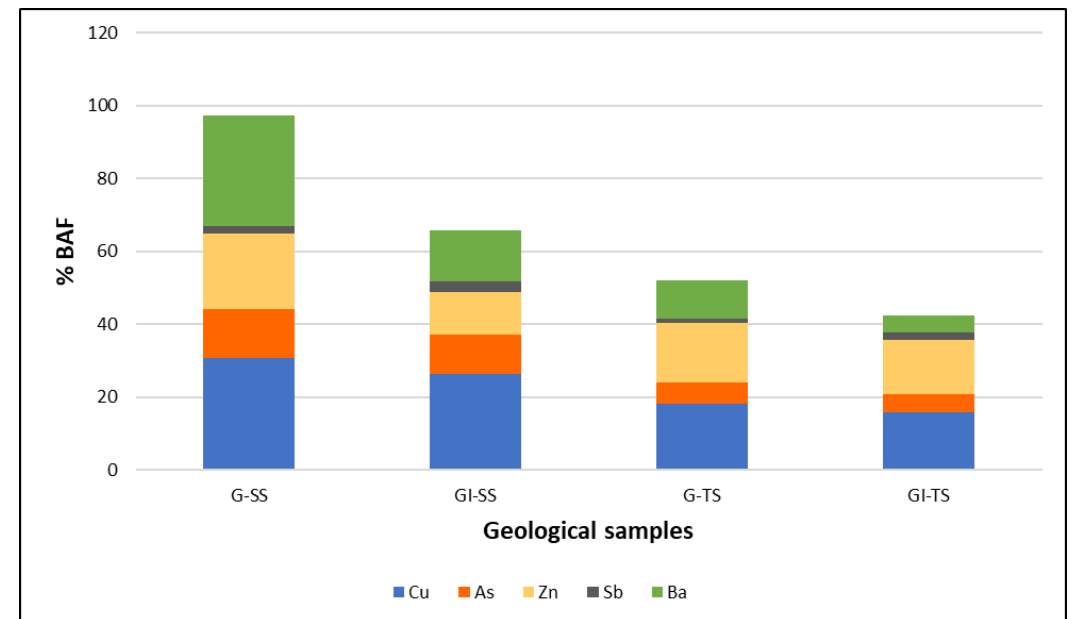


The percentage of bioaccessibility (**% BAF**) for the PTEs, and the carcinogenic and non-carcinogenic risks by ingestion in all fractions were evaluated for children and adults in a recreational setting.

RESULTS AND DISCUSSION

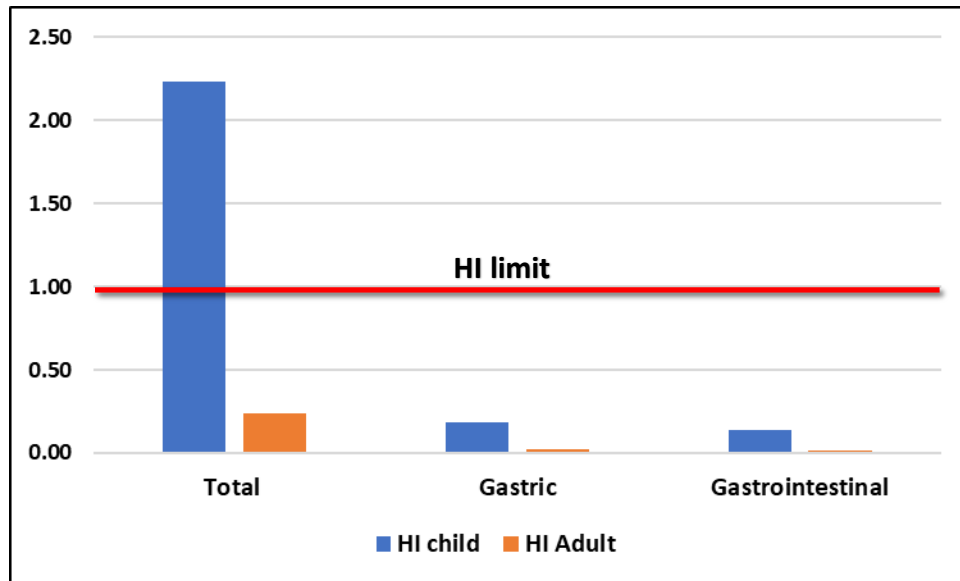


PTEs in terrace and stream sediments

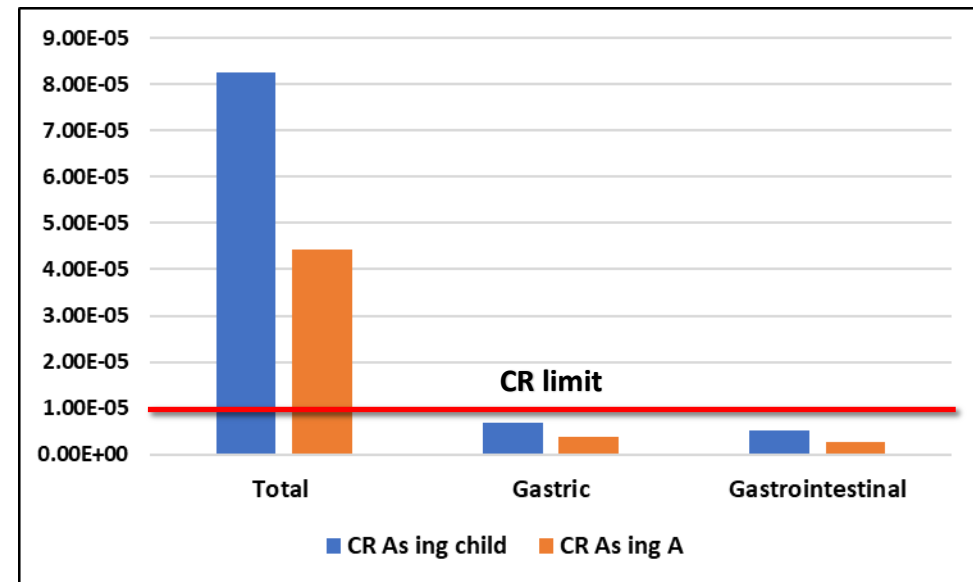


The order of oral bioaccessibility was: Cu>Zn>Ba>As>Sb

RISK TO HUMAN HEALTH



Non-carcinogenic risk by ingestion in recreational setting



Carcinogenic risk by ingestion in recreational setting

CONCLUSIONS

- The oral bioaccessibility is higher in stream sediments than in terrace sediments and is higher in the gastric phase than in the gastrointestinal phase.
- The non-carcinogenic risk is above the limit for children and the carcinogenic for children and adults in the total fractions but not in the gastric and gastrointestinal fractions for the average values.
- Only the "Toro" stream, which is located near a tailings, presents values above the limit for non-carcinogenic and carcinogenic risk in both the gastric and gastrointestinal fractions, so recreational activities are not recommended there.

Thanks!

