A STUDY OF THE GEOCHEMICAL CONTROLS OF LEAD BIOACCESSIBILITY FROM MINE WASTE USING A RESPIRATORY UPTAKE TEST

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RESPIRATORY UPTAKE METHODOLOGY
• Based on Dennis et al., 1984 and Ansoborlo et al., 1999
• 0.45-0.55g of <10 µm size fraction and 20 ml of Gamble’s solution at pH 7.3
• Extraction at 37°C and Separation under centrifugal force
• Determination of Pb by ICP-AES

Conclusions
The leaching rate of lead is dependent on sampling frequency
Insoluble lead phosphate coatings are developing during the test and as a consequence cumulative leached lead concentration decreases asymptotically
The question is raised as to whether Gamble’s solution is an appropriate simulant for lung fluid in studies of lead bioaccessibility since it contains a phosphate buffer
Natural lung fluid is known to contain phosphorous bearing lipids, however its importance in reducing lung bioaccessibility of lead still remains to be assessed

Bioaccessibility: Cerrusite > Anglesite > Lead Sulphide

Implications for site-specific risk assessment
The form of the lead in the contaminated medium is important
The use of total lead, might in the case of lead sulphide rich soils give rise to an erroneous estimate of blood lead level
These simple experiments also indicate a way forward in site hazard ranking in as much as sites dominated by lead carbonate should be prioritised over sites dominated by lead sulphide

Acknowledgments
The British Geological Survey (BGS) under its Development of Capability Programme funded this work. Tony Milodowski of BGS provided the SEM images and EDXA analyses of the lead phosphate overgrowths