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Evaluation of Sources and Options for Possible Clean up of Anthropogenic Mercury Contamination in the Ankobra River Basin in South Western Ghana

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Author(s)

Thomas Mba Akabzaa, Sandow Mark Yidana

ABSTRACT

The study assesses the spatial distribution and sources of mercury contamination in the Ankobra River Basin in southwestern Ghana and discusses possible remediation options and challenges. Eighty-two (82) samples of water and streambed sediments from areas of active and historic artisanal mining and historic mine spoil from large-scale mining were analysed for their total mercury content using cold vapour Atomic Fluorescence Spectrometry (CV-AAS). The highest Hg concentrations were recorded from historic mine tailings, legacy of large scale mines in the area, which averaged 795 ppb but ranged from 80 ppb to 2500 ppb. Concentrations in streambed sediments averaged 139 ppb, but ranged from 63 ppb to 270 ppb. Water, expectedly, gave the lowest Hg concentrations with a mean value of 1.5 ppb, but ranged from below detection to 8 ppb. Areas worked by artisanal miners and historic tailings dumps at Bondaye and Prestea recorded the highest mercury values. These high mercury concentration sites constitute potential sources of major mercury pollution in the area and therefore require major and urgent clean up to mitigate any major health risks. However, any remediation strategy would require further and detailed study of the contaminated sites and an evaluation of known remediation techniques to achieve maximum results.

KEYWORDS

Ankobra Basin, Mercury Contamination, Clean-up, Old Tailings, Sediments, Water

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References

- [1] USEPA, " Nonpoint Source Program and Grants Guidance for Fiscal Year 1997 and Future Years," US Environmental Protection Agency, Office of Water, Washington DC, 1996.
- [2] J. E. Gray, I. A. Greaves, D. M. Bustos and D. P. Krabbenhoft, " Mercury and Methyl Mercury Content in Mine- waste Calcine, Water, and Sediments Collected from the Palawan Quicksilver Mine, Philippines," *Environmental Geology*, Vol. 43, No. 3, 2003, pp. 298-307.
- [3] A. Fuller, " Addressing the Environmental Mercury Problem in Watersheds: Remediation in the Guadalupe River Watershed, SAN Jose, California," *Mercury Study: Report to Congress*, EPA Report 452/-97-0003, 2003. <http://www.epa.gov/govttnuatwi/112nmerc/mercury.htm>
- [4] G. O. Kesse, " Mineral and Rock resources of Ghana," A. A. Balkema Publishers, Accord, 1985, pp. 338-339.
- [5] T. M. Akabzaa, B. Banoeng-Yakubo and J. S. Seyire, " Evaluation of the status of Heavy Metal and Metalloid in Selected Mining Communities, in Adansi West and Amansie East Districts of Ashanti, Ghana," *Ghana Science Journal*, 2003, in press.
- [6] M. Babut, R. Sekyi, A. Rambaud, M. Potrin-Gautier, S. Tellier, W. Bannerman and C. Beinhoff, " Improving the Environmental Management of Scale-Scale Mining Gold Mining in Ghana: A Case

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- [7] E. A. Ofosu-Mensah, " Gold Mining and the Socio-Eco- nomic Development of Obuasi in Adanse," African Jour- nal of History and Culture, Vol. 3, No. 4, 2011, pp. 54- 64.
- [8] K. A. Dickson and G. Benneh, " A New Geography of Ghana," Longman, London, 1988.
- [9] R. G. Eppinger, P. H. Briggs, D. Rosenkrans and V. Ballestrazze, " Environmental Geochemical Studies of Selected Mineral Deposits in Wrangell—St. Elias National Park and Preserve, Alaska," USGS Professional Paper 1619, Gray and Sanzalone, 1996, p. 41.
- [10] APHA, AWWA and WEF, " Standard Methods for the Examination of Water and Wastewater," 20th Edition, Wa- shington DC, New York, 1998.
- [11] N. S. Bloom and W. F. Fitzgerald, " Determination of Volatile Mercury Species at the Picogram Level by Low- Temperature Gas Spectrometry," Analycal Chimica Acta, Vol. 208, 1998, pp. 151-161. doi: 10.1016/S0003-2670(00)80743-6
- [12] M. Barcelona, J. P. Gibbs, J. A. Helfrich and E. E. Garske, " Practical Guide for Groundwater Sampling," Illinois State Water Survey IDWS Contract Report 374, 1985.
- [13] C. A. J. Appelo and D. Postma, " Geochemistry, Groundwater and Pollution," 2nd Edition, A. A. Balkema Publishers, Accord, 2005.
- [14] W. H. O., " Guidelines for Drinking Water Quality, Health Criteria and Supporting Information," Vol. 2, World Health Organisation Geneva, 1996.
- [15] J. D. Hem, " Study and Interpretation of the Chemical Characteristics of Natural Water," US Geological Survey Water Supply Paper, 1985, pp. 142-143.
- [16] African Development Bank, " Environmental Guidelines for Mining Projects," 1994, p. 82.
- [17] P. V. Koval, G. V. Kalmychkov, V. F. Gelety, G. A. Leonova, V. I. Medvedev and L. D. Andrulaitis, " Correlation of Natural and Technogenic Mercury Sources in the Baikal Polygon, Russia," Journal of Geochemical Exploration, Vol. 66, No. 1-2, 1999, pp. 277-289. doi:10.1016/S0375-6742(99)00041-2
- [18] J. C. Varekam, B. Kreulen, B. Brink and E. L. Mecray, " Mercury Contamination Chronologies from Conecticut Wetlands and Long Island Sound Sediments," Environmental Geology, Vol. 43, 2003, pp. 268-282.
- [19] United States Environmental Protection Agency, USEPA, " Mercury Study Report to Congress, Volume II: An Inventory of Anthropogenic Mercury Emissions in the Uni- ted States." Investigation Number EPA-452/R-97-004, 1997.
- [20] E. A. Jenne, " Adsorption of Metals by Geomedia: Variables, Mechanisms and Model Application," Academia Press, Boston, 1997.
- [21] M. G. Kelly, " Effects of Heavy Metal in the Aquatic Biota. In the Environmental Geochemistry of Mineral Deposits. Part A: Processes, Techniques and Health Issues," In: S. G. Plumlee and J. M. Logsdon, Eds., Reviews in Economic Geology, Vol. 6A, 1999, pp. 363-371.