Arsenic contamination of drinking water in some localities of Vila Real – Northern Portugal

C. SILVA, H. SOUSA, O. LOPES AND P. FAVAS

University of Trás-os-Montes e Alto Douro, 5001-801 Vila Real, Portugal, (pjcf @utad.pt)

The occurrence of problems resulting from arsenic contamination of drinking water in Vila Real (Northern Portugal) was recognized by the Supplier Company of domestic water himself. One of the most significant water quality problems that will be present for a long time to come is the Rebordolongo site, which has arsenic contamination far in excess of any other area.

This preliminary study discusses the geological occurrence, the origin, the environmental impact and the health risks of arsenic in drinking water of the public water supply of Rebordolongo. The approach taken by this study was to compare the water quality were from boreholes and wells with the water quality in the homes of the consumers. Hydrochemical analyses have confirmed the presence of dissolved arsenic in drinking waters, with concentrations exceeding the current WHO potable water guideline. The total arsenic content of all these waters varies between <10 µg/L, and 28 µg/L.

The field work have confirmed placed near the one of the wells an abandoned wolfram mine, the waste from which is typically rich in arsenopirite. The mineralogical composition of quartz-veins and waste samples from the mining site were undertaken to assess their potential as a subregional source of arsenic contamination. Tailings from the site are predominantly composed of quartz detritus with abundant arsenopyrite. The sulphides are mainly arsenopyrite and pyrite, with some galena and chalcopyrite.

The relatively high arsenic concentrations in the waters from the mine site may reflect the oxidation/weathering of arsenopyrite and other sulphide-bearing mine tailings. This allows for the solubilization of metals. Arsenic concentrations in domestic water were higher than those in the water from boreholes, probably suggesting direct mixing of effluent from mining area. Meanwhile, the domestic waters do not contain more than 14 µg As/L. However, arsenic is highly concentrated in the iron oxyhydroxides sampled in the bottom of the water reservoir. Upon contact with air, these waters locally form oxyhydroxides deposits, sorbing effectively arsenic. These deposits contain 0.83% As. Therefore, one can conclude that the environmental and health impact of these waters in Rebordolongo is not negligible.

A complementary phase that is in progress intends to characterise arsenic and heavy metals speciation more clearly and determine the link with iron oxyhydroxydes.

Global Ca-isotope signatures in post-Snowball Earth cap-carbonates

J.C. SILVA[1], T.F. NÄGLER[1], I.M. VILLA[1], K. KYSER[2], A.N. SIAL[3], G.M NARBONE[2], N.P JAMES[2], DA SILVA[4] AND M.A. FILHO

[1]Universitat Bern (juancst@geo.unibe.ch, naegler@geo.unibe.ch, villa@geo.unibe.ch)
[2] Queens University (kyser@geol.queensu.ca, narbonne@geol.queensu.ca, james@geol.queensu.ca)
[3]Univeridade Federal de Pernambuco (sial@ufpe.br)
[4]CPRM (masf@re.cprm.gov.br)

$\delta^{44/40}\text{Ca}_{(\text{seawater})}$ values of Neoproterozoic cap-carbonates in NW Canada and NE Brazil overlying glacigenic units are reported. While cap-carbonates (Rapitian and Jaccoca Fms) overlying *ca* 0.74 Ga Rapitian diamictites display $\delta^{44/40}\text{Ca}_{(\text{seawater})}$ values increasing from –1.9‰ to –0.7‰, cap-carbonates (Raventhroat-Hayhook and Acaua Fms) overlying *ca* 0.635 Ga Marinoan diamictites display $\delta^{44/40}\text{Ca}_{(\text{seawater})}$ values decreasing from -0.9‰ to –1.8‰, followed by a progressive up-section increase to values near 0‰. The $\delta^{44/40}\text{Ca}_{(\text{seawater})}$ values displayed by the post-Marinoan cap-carbonates are undistinguishable from those of their correlative Kailber and Maiberg Fms (NW Namibia, Kasemann *et al.*, 2005). We suggest that changes in the $\delta^{44/40}\text{Ca}_{(\text{seawater})}$ values of the studied cap-carbonates reflect changes in the Ca-isotope composition of their coeval seawater. The similar $\delta^{44/40}\text{Ca}_{(\text{seawater})}$ values displayed by coeval carbonates from a deep to shallow marine profile (lower Hayhook Fm) suggest a homogeneous Ca-isotope composition of oceans. Differences in the degree of diagenetic overprint of these samples along with the sub-greenschits facies of metamorphism of the Brazilian cap carbonates suggest preservation of the sedimentary Ca-isotope compositions even after diagenesis and burial. The global nature of the $\delta^{44/40}\text{Ca}_{(\text{seawater})}$ values, along with varying Ca-isotope compositions with stratigraphy displayed by the post-Marinoan and Post-Rapitian cap-carbonate indicate that Ca-isotope stratigraphy can be used to correlate cap-carbonate successions worldwide.

Reference

Kasemann, S., *et al.* (2005), *Earth and Plan. Sci. Letters*, **231**, 73-86.