IDENTIFICATION OF ARSENIC LEVELS IN SRI LANKAN GROUNDWATERS AND REMOVAL OF ARSENIC FROM POTABLE WATERS

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Arsenic, which is highly toxic to humans even at low concentrations is a dominant trace pollutant found in drinking water. (Sri Lankan standard (SLS 614,1983) for drinking water is 50 ppb whereas WHO and proposed USEPA standard are 10ppb). Arsenic originates both from natural and anthropogenic sources. Acute short-term exposure to high doses of arsenic can cause adverse health effects. Most commonly reported symptoms of chronic arsenic exposure are conjunctivitis, melanosis, hyperkeratosis and some other skin lesions. In severe cases, gangrene in the limbs and malignant neoplasm have also been observed. (Christen, 2000).

In our region, Bangladesh is facing a severe pollution of drinking water due to arsenic. This arsenic derives from the geological strata underlying Bangladesh. The effect became dominant due to large drops in groundwater levels. Due to Farakka dam on the river Gangas in India, groundwater level is being lowered markedly during the dry season in the Northwestern and Western regions of Bangladesh, exposing the dry sediment layer to oxidation. As a result pyrites have been dissolved in groundwater releasing arsenic into drinking water supplies.

In Sri Lanka also groundwater consumption and construction of dams across rivers are increasing. Within last twenty years many large dams were constructed. Therefore high drawdown of water table in downstream areas of these dams may lead to similar problems since the geological aspects are similar (pyrites are found in calcipyres and graphite-bearing veins in Sri Lanka (Cooray, 1984)). Hence the problem may exist in Sri Lanka, though it is not reported yet. One reason for absence of such data is the lack of facilities to measure arsenic. Therefore in this research the basic data on arsenic levels and its spatial variation in aquifers in Sri Lanka are being obtained.

Most of the available arsenic treatment technologies perform well at high cost. It is important to develop a low-cost treatment method for low-income countries. Presently SORAS method, introduced by a Switzerland-Bangladesh joint research group (Wegelin et al., 2000), is used at household level to treat drinking water containing high arsenic. In this method PET or other UV-A transparent plastic bottles are filled with raw water. Few drops of lemon are added and the bottles are shaken vigorously to increase the oxygen concentration in the water. Then bottles are exposed horizontally to full sunlight and after about 12hours they are kept vertically for sedimentation. Finally the treated water is abstracted by filtration through a cloth. Feasibility of this treatment method is also researched in the present study.

This study will also study a new low cost treatment method for As(III) removal by sorption on laterite. Laterite found abundantly in Southwestern Sri Lanka contains iron. Mainly As(III) will be studied due to its high toxicity, mobility and solubility than As(V). To reliably analyze the arsenic level in water, a method based on the Hydride Generation-Atomic Adsorption Spectrometry (HG-AAS) is being developed at the Faculty of Engineering, University of Peradeniya.