

# The formation mechanism of arsenic contaminated groundwater in alluvium of Bangladesh.

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Bangladesh and West Bengal of India have been exposed the most serious arsenic pollution in groundwater in the world. Although a lot of investigations have been reported for the reason of arsenic contamination which have grown into the serious problem since late 1970's, that is still unknown.

Bangladesh is facing the Bay of Bengal, and most of the nation land is located on delta plain formed by the fluvial sediments transported by Ganges-Meghna-Brahmaputra river system. That sediments supplied from Himaraya are composed of silty and clayey soils and have the Pleistocene to Holocene age.

The most suitable hypothesis for the arsenic contamination mechanism has been shown that arsenic in groundwater was desorbed by ferric oxihydroxide with changing redox condition.

The purpose of the research is traced the recharge source and aquifer distribution using hydrogen and oxygen stable isotope ratios, and redox change in aquifer using the concentration of arsenite which is a kind of inorganic arsenic species.

Thana Sonargaon locating about 25km southeast of Dhaka is selected as the study area, and sampled the groundwater from 233 tubewells in the range of about 4km square in the late September to early October, 2003.

Oxygen stable isotope ratios are varied from -7.5 to -2.1 permillage and -5.6 to -5.1 permillage, in shallower and deeper aquifers, respectively. Shallower aquifers have different distribution tendency with area, oxygen stable isotope ratios varied from -5.0 to -4.3 permillage and -7.5 to -2.1 permillage, in Pleistocene and Holocene aquifers, respectively.

Arsenite concentration has the large regional difference, and varied from 0 to 1460ppb. Most of samples have less than 50ppb in Pleistocene aquifers, however, the large portion of samples in Holocene aquifers have more than 100ppb. According to the vertical distribution tendency, the maximum peak of arsenite concentration is exist in depth of about 25m, and extremely low concentrations are shown in deeper than 200m.

Oxidation reduction potential shows the arsenite concentration elevation in strongly reducing environment. Moreover, Arsenite and Ammonia concentrations show positive correlation. Those facts are suggested that arsenites were desorbed in reducing condition.

Arsenite concentrations are extremely elevated in response to oxygen stable isotope ratios variation from -4 to -3 permillage, thus, it is extrapolated that the rate of arsenite dissolution is depend on the season.