

Aquifer structure including arsenic contaminated ground water in Sonargaon, Narayanganj, Bangladesh

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Arsenic contaminated groundwater is widely distributed in the alluvial plain of the Ganges-Brahmaputra and the Meghna Delta in Bangladesh. Arsenic content of ground water in Holocene shallow aquifer is higher than in Pleistocene aquifer. But, opinions are divergent on the formation mechanism of arsenic contaminated groundwater. In order to clarify this formation mechanism, we are investigating on geochemical properties of groundwater and geological features of aquifer system in Sonargaon area where is located about 20 km east from Dhaka City. Geomorphologic feature of this area is assumed from the margin of Pleistocene hilly area to Holocene alluvial plain of the old Brahmaputra River. A core drilling at Fatehpur Darikandi site, northern part of Sonargaon area and 7 percussion drillings at adjacent sites are carried out for the investigation on aquifer structure and its properties.

As the result of those drillings, the following aquifer structure became clear. In this area, bluish gray colored fine-medium sand layer (24 to 50m thick) widely distributes in the alluvial plain. This layer be correlated with Holocene and deposited in the fluvial environments. Biotite is abundant in this sand layer. Below this sand layer, gray colored tick clay-silt layer (4 to 20 m thick) is also widely distributed in the subsurface of alluvial plain (24m to 45m deep) and including of vivianite and plant fragments. This clayey layer is deposited in the fresh water and reducing environments in lake or marsh. Below these Holocene sediments, brown colored sand and gray colored clay alternation widely distributes throughout the research area. This alternation is directly exposed in the hilly area located in the western part of the research area. Reddish color is strongest in upper most part of this sand layer, and gradually deceases to deeper part. So, the reddish color is occurred by weathering from eroded ground surface at the last glacial age.

The upper most aquifer consists of Holocene fine to medium grained sand layer. This aquifer is under reductive environment. The lower aquifer is apparently divided from the upper aquifer by the thick fresh water clay layer about 10 m thick. The lower aquifers consist of medium to coarse sand layer. The upper part of the lower aquifer is under oxidative environment. Ground water in the lower aquifer is directly cultivated from the surface of hilly area by meteoric water. This aquifer structure contributes to the formation of the arsenic contaminated groundwater as geologic background.