

Characteristics of groundwater and alluvial sediments in upper part of Arakawa lowland and environmental science issues

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Recently, dissolution of heavy metals in groundwater from sediments has become one of the severe global issues in field of the Environmental Sciences. Especially, in contaminated area of the arsenic, there are some cases where people have received serious health problems (Bangladesh, Vietnam, etc.). In previous papers, main mechanism theories about dissolution of Arsenic to the groundwater were summarised as follows; (1) due to oxidation of sulfide minerals such as pyrite, (2) due to desorption of Arsenic adsorbed to iron oxides under reducing conditions, (3) due to alkalinization of groundwater, and (4) due to ionic exchange of Arsenic and Phosphate ion produced by fertilizer.

On the other hand, in Japan, Arsenic contaminated areas have been reported in Fukuoka, Osaka, and Chiba prefecture. In Saitama prefecture, also Arsenic concentration exceed the allowable limit set by the Environment Agency is detected in shallow aquifer around area of upper part of the Arakawa lowland. Therefore, we made a lot of geomorphic-geological profiles, and clarified the standard stratigraphy and its continuity. And also, we carried out groundwater investigation and took all-core samples according to boring exploration using rotary boring machine. Using samples taken from the cores, we carried out the dry analysis and wet analysis around 25 cm pitch. At first, as the dry analysis, we measured the weight content of Arsenic, Sulfur and Ferric oxide using the fluorescent X-ray analysis (XRF). And, as the wet analysis, we measured Arsenic concentration using the inductively-coupled plasma mass spectrometry (ICP/MS) and measured Iron concentration using the inductively-coupled plasma atomic emission spectrometry (ICP/AES).

In this paper, we discuss the dissolution mechanism of Arsenic to shallow groundwater in this region based on the result of analysis mentioned above.