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Elevated Arsenic Levels in the Weches Formation Nacogdoches County, Texas

The Weches Formation (Eocene) in east Texas contains arsenic at elevated levels. Eight samples from a road cut near Nacogdoches, Texas average almost 100 ppm arsenic compared to a global average shale value of 13 ppm. The samples were taken from a soil profile in which arsenic content appears to decrease with higher degrees of weathering. The two least weathered samples average 122 ppm arsenic, while the two most weathered samples average 49 ppm. The apparent arsenic loss occurs in slightly weathered green mudstone ("greensand") to progressively more weathered red soil. In addition to arsenic, magnesium is solubilized as the rock-forming clay structure is destroyed during weathering. In the least-weathered samples, arsenic probably occurs in accessory pyrite that is present at about 1%. In the more-weathered samples, oxidation and hydrolysis of pyrite and other minerals produces amorphous $\text{Fe}(\text{OH})_3$ and goethite, both of which are known to adsorb oxidized arsenic species. Induced-neutron activation analysis (INAA) was used to determine arsenic. This technique requires little sample preparation, thus it prevents under-reporting of arsenic because of failure to dissolve sulfides. Iron, magnesium, and thorium also were determined by INAA. Clay structural analysis and goethite determination was by x-ray diffraction (Feille and Ledger, 1996). Very few data are available on arsenic in east Texas, but concentrations as high as those seen here could affect groundwater, lake and stream sediments, and wind-blown dust. More work is needed to see if elevated arsenic levels are present throughout east Texas.