

Title: Arsenic and Arsenic Species in the Rio Grande, and the Effect of Irrigated Lands
Authors: Dilley, L M, Norman, D I, and Miller, G P.
Department of Earth and Environmental Sciences, New Mexico Tech, 801 Leroy Place,
Socorro, NM 87801-4796 United States

The Rio Grande was used for centuries and continues to be used for irrigation in New Mexico. There are anomalous groundwater arsenic concentrations in the New Mexico part of the Rio Grande watershed, and river waters have arsenic concentrations of between 2 and 16 ppb in the Middle Rio Grande valley. Of concern is build up of arsenic in irrigated fields. In order to determine if arsenic is being adsorbed on irrigated fields, irrigation water and drain water are measured weekly. The chemical behavior and mass balance of arsenic in the irrigation and return flow conveyances in the San Acacia, New Mexico area was evaluated to determine changes in the arsenic flux on a spatial and time basis. Waters at the inflow into the irrigated fields and along the outflow drainage channels were sampled and tested for arsenic species 3^+ and 5^+ . Total arsenic levels in waters used for irrigation ranged from 1.2 to 3.4 ppb. Arsenic levels measured in the water that had filtered through the fields ranged from 0.3 to 2.8 ppb. Arsenic 3^+ for the inflowing waters ranged from 0.2 to 2.1 ppb and for the outflowing waters averaged 0.1 ppb. Arsenic 5^+ ranged from 0.5 to 2.1 ppb for the inflowing waters and averaged about 0.7 ppb for the outflowing waters. The TDS in drain water is about 5 times that in irrigation waters. We estimate that greater than 90 per cent of the arsenic in irrigation waters remains in irrigated fields. Preliminary analysis of irrigated soils indicates they contain 1.6 to 2.7 ppm labile arsenic, which is consistent with a century of arsenic accumulation. A major implication is that irrigated soils in the Rio Grande Valley are an arsenic time bomb that could catastrophically release their arsenic in the future.