Microbial, geochemical, and physical responses to biostimulation for U(VI) reduction in soil columns

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During biostimulation of microbial iron reduction for the purpose of U(VI) removal at the Rifle Integrated Field Challenge site, the onset of sulfate reduction has been linked to decreased rates of U(VI) removal. Column experiments have shown sulfate reduction to have no adverse effect on U(VI) removal. Prolonged iron reduction through electron donor limitation has also been demonstrated. While effective for prolonging iron reduction, it results in limited decreases in effluent U(VI). To gain further insights into these processes, an experiment is being conducted to determine the activity of iron reducers before and after the onset of sulfate reduction. Sediments were augmented with ^{57}Fe goethite to track minute goethite changes via Mössbauer spectroscopy. Columns with sediment from the Rifle site have been set up and groundwater amended with acetate and U(VI), is pumped through them. Effluent is monitored for acetate, Fe(II), U(VI), and sulfate. Columns are sacrificed at 10 day intervals, and the sediment is analyzed for chemical, geochemical, and microbiological parameters. Changes in ^{57}Fe goethite are detected over time. SEM images show U associated with Fe and S. The experiment begins with highly similar bacterial populations (85% similarity), which drops to 65% by day 60. The microbial population is dominated by 6 TRFLP peaks. Three of these peaks have been identified, a *Desulfovibrio*-like clone, a *Rhodoferax*-like clone, a *Geobacter*-like, totalling 14.5, 26, and 3.1 % of the overall community profile, respectively.

Elemental composition of $PM_{2.5}$ aerosols in India

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As a part of the $PM_{2.5}$ Technology Assessment and Characterization Study-INDIA daily aerosol samples were collected from July 2003 to December 2005 at three sites: Delhi, Mumbai, and Kolkata. Sulfate was determined on all samples while the 2003 and 2005 samples also had 15 metals determined: Mg, Al, Ca, V, Cr, Mn, Fe, Co, Ni, Zn, As, Se, Cd, Sb, and Pb. This is the second of a set of papers that deals with the composition of fine particulate matter at the urban site in Delhi We use the large daily elemental database to explore the inter-elemental relationships with statistical methods and air trajectories on a seasonal basis to glean insight into the regional and local area sources impacting Metropolitan cities.