effect of varying leaching column diameter: Comparison of Column Sizes (2-inch, 4-inch, and 6-inch diameters). Laboratory 3 evaluated the effects of the leaching column weathering procedures on samples of shale in three cylindrical column structures of identical height (24-inches) and different diameters (2-inch, 4-inch, and 6-inch). Results of this comparison are presented in Figures 3.5a and 3.5b. A comparison of the effect of leaching column sizes upon analyte concentrations showed that mean and maximum alkalinity concentrations produced from the shale sample in the 6 inch column were not greater than those corresponding to the smaller column diameters. Curiously, the calcium concentrations produced in the leachate from the 2 inch and 4 inch columns declined significantly through time, while that from the 6 inch column did not decline – resulting in a much higher median calcium concentration from the 6 inch column.

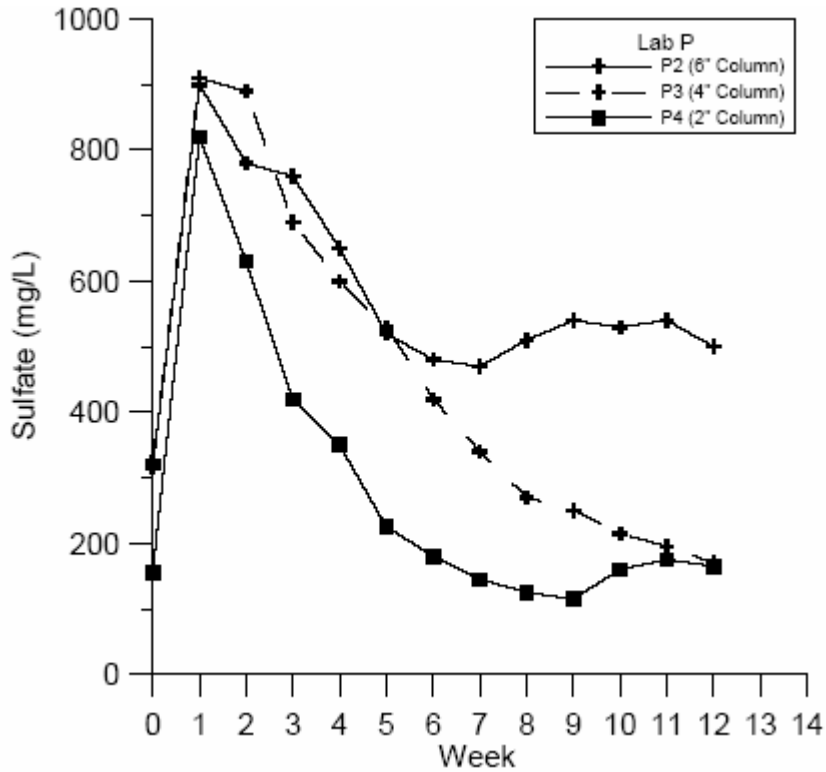

Figure 3.5a. Sulfate concentrations of Brush Creek shale using two inch, four inch, and six inch column diameter.

Figures 3.4 and 3.5 show concentrations of sulfate and alkalinity through time for the Brush Creek shale from various leaching columns. Sulfate concentrations from the three diameters of leaching columns at Lab 3 are plotted in Figure 3.5a. These plots resemble the classic leaching behavior shown in White (1986), with the steep initial slope, followed by supersaturation, and then a flattening (6-inch column) or decline (2-inch and 4-inch columns) in concentration through time for the remainder of the weathering test. Notice that these plots do not originate at zero, they extend to negative weeks time, indicating that weathering of the shale samples commenced prior to the start of the leaching column tests (i.e. prior to the initial flush).