Supplemental Information

Characterization of Nano-sized Colloidal Phosphorus Species in Drain and Trench Waters from a Fertilized Clay Soil Using AF4

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Figure S1. AF4 fractograms of NIST-certified polystyrene nanoparticles with diameters of 20, 50 and 100 nm (a) and correlation between retention time and particle diameter (b) and fractograms of polystyrene-sulfonate standards with molecular weights of 1.1, 15.8 and 75.6 kDa (Postnova Analytics) (c), showing good particle separation over the analyzed size-range. The given particle diameter in nm for \( t_{14} \) is based on AF4 theory and based on elution times of the nanoparticle standards for \( t_{16} - t_{25} \). For fractionation of the polystyrene nanoparticles, 0.01% (w/v) SDS was added to the carrier (3 mM NaHCO₃).
Figure S2 Particulate (>0.45 μM) P plotted against particulate Al and particulate Si. For the waters collected at t1 and t2, the particulate P shows a good correlation with particulate Al and Si whereas the samples collected at t3 deviate from this relationship.
**Figure S3** AF4 fractogram of the drain water sample collected at t1. P concentrations were below the detection limit. The peak of Si and Al indicates the presence of colloidal clay minerals.
Figure S4 AF4 fractogram of the drain water sample collected at t2 at a large (upper) and small scale (lower). Phosphorus is associated with clay minerals in the > 20 nm size-fraction.
Figure S5 AF4 fractograms of the second set of trench (upper) and pipe drain (lower) waters collected at t3. The two sets of trenches and pipe drains were treated as replicates.