IMPROVING THE ACCURACY OF SEDIMENT AND SEDIMENT-ASSOCIATED CONSTITUENT CONCENTRATIONS IN URBAN RUNOFF

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ABSTRACT

Sand-size particles (greater than 63 micrometers) in urban stormwater runoff have the potential to produce substantial bias and/or poor precision during sample collection, splitting and laboratory analysis due to their tendency to settle through the water column quicker than smaller particles. New methods have been developed that attempt to overcome some of the limitations associated with sample splitting and analyzing urban stormwater runoff samples containing sand-sized particles. Physical removal of solid-phase material greater than 125 micrometers by wet sieving has increased the efficiency of commonly used sample splitting devices such as churn splitters. Once separated, the sieved solids and remaining aqueous samples can be analyzed for sediment-associated constituent concentrations, such as trace metals, using a modification of U.S. EPA Method 200.7. This modified version digests the entire sample, rather than an aliquot of the sample. These techniques have improved the accuracy of sediment and sediment-associated constituent concentrations in urban stormwater runoff. However, errors associated with the sample collection process have largely been ignored. There are issues associated with automated water-quality samplers that make it challenging to collect samples that adequately represent the range of sediment concentrations transported in storm sewers. These devices typically collect water from a fixed point, relying on a homogeneous mixture. Previous studies have shown that sediment concentrations near the bottom of the water column in a storm sewer can be greater than those measured near the surface, even in pipe diameters as small as 12-inches. The U.S. Geological Survey is currently developing a prototype sampler intake that will automatically adjust its position in a storm sewer to allow sample collection at any depth in the water column. This prototype will limit bias introduced with fixed-point sampling and will allow the sub-sampling of the heterogeneous gradient of solid-phase material transported in a storm sewer ranging from coarse particles that concentrate near the pipe floor to particles of low specific density, such as organic detritus, that tend to float near the surface.

KEYWORDS

wet sieve, suspended sediment, total suspended solids, autosampler, trace metals