RE-EVALUATING MEASUREMENT METHODS

Is TSS a good measure of effectiveness for pretreatment technologies?

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In many best management practice (BMP) evaluation programs, such as the Technology Acceptance Reciprocity Partnership (TARP) and the Washington Department of Ecology's Technology Assessment Program-Ecology (TAPE), hydrodynamic separators (HDS) are being designated as pretreatment devices focused primarily on the removal of trash, oil, grease, organic debris and coarse solids.

Engineers recognize that these devices can be an important part of an effective treatment train since they reduce mass loads to other technologies such as filters, ponds, wetlands and bioinfiltration facilities that are effective for total suspended solids (TSS) removal. But the pretreatment devices also can be rendered ineffective or expensive to maintain by heavy loads of the aforementioned gross and coarse pollutants.

In these programs and others that are in progress, laboratory testing protocols are being determined to set benchmark treatment flow rates and thus establish and verify performance characteristics. These studies typically use silica sand with a median particle-size distribution d_{50} gradation of 100 μm.

However, the field verifications are focused on TSS removal requirements ranging from 40 to 50 percent. What is problematic is that this performance measure is not consistent with the lab testing or the technology's intended use. Since the devices are not designed to remove a high fraction of the TSS load, why are we measuring their effectiveness using TSS influent and effluent monitoring?

Research indicates that standard influent and effluent protocols for TSS are ineffective for measuring the transport of coarse materials that tend to move in clumps and not get picked up by the samplers. It has also been suggested that other methods such as bedload samplers may be more appropriate. Yet the coarse particles are what the HDS devices are designed to capture.

It seems more appropriate to establish field-monitoring protocols that measure what the device is designed to do. Literature has suggested methods including measurement of the captured load versus what has exited the unit along with characterizing pollutants in terms of particle size and composition.

As the demand for this type of product and the need for treatment trains grow, we need to re-evaluate our methods of measuring the effectiveness of these devices while recognizing the types of pollutants targeted, though important, are not TSS.

Using this approach could help solve another problem. Many permit holders across the nation are struggling with how they can show permit compliance or justify the millions of dollars spent on BMPs when TSS reduction calculations show only minor impacts on the estimated total load discharged into receiving waters. These calculations can easily miss tons of gross and coarse solids that are unaccounted for in such estimates. Using a different sampling approach for these technologies would provide a more accurate account of and model for actual pollutant load reductions in regulatory efforts.

In closing, if we look at the laboratory analytical methods for gross solids, settleable solids and TSS, it is interesting to note that for TSS we use filters, for settleable solids we use Imhoff cones, and for gross solids we use screens. Maybe this is trying to tell us something about how we should apply our treatment technologies?

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