

## UNDERSTANDING STORMWATER CHALLENGES

Recycling plants are ever-changing operations. You handle different recyclables in varying volumes every day. You operate and maintain a long list of equipment and sometimes add new processing tools. A host of customers and vendors cross your scales, bringing an array of materials and equipment onto the premises. While the dynamic nature of your recycling operations might keep things interesting, it also causes fluctuations in the type and amount of contaminants that appear in your stormwater. Even if you think your site doesn't change much, the various stages of scrap processing operations and even international market shifts will influence your product mix on site and, ultimately, the mix of materials that might be exposed to stormwater. Further, the volume of stormwater and the intensity of any single storm event can fluctuate seasonally. During drier periods, for example, contaminants can accumulate on the ground and get flushed into the drain when it rains. This variability can make it difficult to characterize the complexity of stormwater-related issues at any one yard. Most important, these variables can lead to discharges of contaminants above benchmark or effluent-limit concentrations.

## SEEKING STORMWATER SOLUTIONS

To understand your stormwater contaminant challenges, it's helpful to conduct a particle size distribution analysis of your operation's stormwater runoff. A PSD analysis reports on the total suspended solids, or TSS, present in the water altogether and in subcategories by size, ranking the relative volume in each size range. The analysis is shown in a simple chart that notes the predominance of larger particles versus smaller particles.

Understanding the relative sizes of particles in your stormwater will help you assess your options for removing the TSS from the water. Contributors to TSS, especially dirt, can act as vehicles to transport heavy metals, oil, grease, PCBs, and other contaminants. If particle sizes are larger, gravity separation could be a viable option for removing the TSS. If particle sizes are smaller, you might need to look at finer filtration or coagulation of particles to remove them. But what if you've already reduced your TSS significantly, and additional contaminants still remain?

Let's look at heavy metals as an example. These contaminants can cause real headaches for scrap facilities, especially when they become heavily dissolved in stormwater. That's why it's a good idea to analyze your stormwater for both total concentrations and dissolved concentrations of metals. A larger fraction of dissolved metals usually means you'll need to implement a more complex treatment solution.

To tackle a dissolved metals problem at a recycling yard, you need to understand the relationship between the pH of the water and the solubility of the heavy metals you're trying to remove. In our company's experience, stormwater runoff at most sites is usually close to neutral at a pH of 7.0, plus or minus 0.5 units. If you were looking at a theoretical solubility curve for copper, you would see that up to about 3,000 parts per billion of copper can remain dissolved in a solution of pH 7.0. If you make the water more alkaline by increasing the pH to 8.0, however, only roughly 80 ppb can remain in the dissolved phase. You would see a similar phenomenon with zinc. At a pH of 8.0, up to 8,000 ppb of zinc can be found in the dissolved phase, but if you increase the pH to 9.5, only about 90 ppb can remain in the dissolved phase.

Unfortunately, this is only the tip of the iceberg, merely one theoretical relationship between two common heavy metals and pH. In a real-world environment, further complicating the water chemistry would be other metals, fluctuating TSS concentrations, oil and grease, and other dynamics that can affect these relationships.

Given the changing nature of recycling facilities, it makes sense that their interaction with the built and natural environments around them would be just as dynamic. Stormwater is one of the most complex of those interactions. It's not simply a problem of dirt floating around in your rain water. Every site is unique. Whether you're a company owner, facility engineer, or yard manager, you should consider these variables when evaluating your stormwater control practices on site and your approaches for treating stormwater if and when the need to do so arises. ■

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**Stormwater is not simply a problem of dirt floating around in your water.**

*Publisher's note: Scrap invites contributions to this column on environmental topics of interest to recycling operations. Submissions should be about 800 words in length. Send submissions or queries to Publisher Kent Kiser at kentkiser@scrap.org.*