

Are You Still Designing For The First Flush?

In today's rapidly changing world many communities are facing NPDES requirements for post construction pollution controls and TMDL allocations for retrofitting existing developed areas. Naturally, these communities are concerned about rising costs of implementing BMP practices, both for the development industry with new construction, and for the community's faced with retrofitting their older stormwater systems. In developing standards for water quality BMPs, there is a need to minimize the cost of BMPs. A common method to reduce the size and cost of a BMP is to reduce the required treatment capacity of the BMP by using the concept of only treating the "first flush".

First flush treatment standards are about cutting costs.

First flush treatment most often refers to diverting the early water flow of a rain event off line, flowing it through a treatment structure of minimal size, and allowing the rest of the flow to go untreated. It is common to utilize a diversion weir to direct the water flow off line.

Once the water flow is sufficient to top the diversion weir, the hydrodynamics of the treatment system and the direction the pollutants will travel is likely to dramatically change. The tendency will be for the water flow to take the path of least resistance and travel straight ahead, and not go offline for treatment. It is natural to expect floating debris to pass over top the submerged diversion weir. In addition, an upwelling along the face of the diversion weir will lift sediment over the top of the weir as well. The result of the diversion weir being topped is a significant reduction in the removal efficiency of the entire treatment system. Often test data commonly provided by offline treatment system manufacturers references only the flow that passes through the treatment structure, and ignores the portion of the flow that went over the diversion weir.

The removal efficiency of an offline treatment system is significantly reduced when water flow passes over top of its diversion weir.

Especially for large watersheds, when the measured transport of a contaminant is analytically represented as the time-dependent ratio of the cumulative normalized mass to the cumulative normalized flow volume, one can demonstrate that the majority of a pollutant load is not necessarily delivered during the early part of the runoff hydrograph. The selection and potential efficiency of a unit operation or process technology may in fact require the capability to treat the entire duration of the runoff from a mass basis, and not just the early part of the runoff hydrograph from a concentration basis. You are taking a chance when you do not treat all your water flows, and possibly allowing pollutants to threaten downstream waters.

With the implementation and evolution of TDML guidelines, treating just the first flush will be likely become a standard of the past.

TDML guidelines will likely require treatment for the entire rain event.

As state regulatory agencies negotiate with the EPA on their TDML guidelines, there is a rule of thumb that will likely be the outcome of all points of contention. That is, water bodies that are popular to drain stormwater into will likely be beyond allowable TDML guidelines, and water bodies that are relatively remote and unused will be healthy and within TDML guidelines.

Over the past decades, the EPA has acquired significant water quality expertise, and is becoming more involved in asserting their expectations with regard to water quality, and TDMLs will be the tool that quantifies these expectations.

Across the nation, developers continue to install stormwater treatment systems that deal only with the first flush even though it is inevitable and understood that that first flush systems are going to become obsolete.

Local municipalities and commercial land owners will eventually be responsible for the cost to upgrade their watersheds.

Tax payers will likely be burdened with the majority of the costs for reducing the discharge of contaminants conveyed by stormwater, and many first flush systems will require replacement with systems that treat the entire flow. With regard to water quality issues, land developers typically will only do what is required by the agencies that oversee their projects. It will be up to these regulatory agencies to decide when treating the first flush is no longer adequate.

The good news is that the technology currently exists to do an effective job of treating the entire stormwater flow.

Some structural BMPs are already designed to be on line with the entire flow and have proven to be highly effective.

Treatment technologies can be combined in series to form treatment trains, thus increasing the scope of treatment and sustainability. All that is needed is the incentive and determination to put first flush treatment requirements in the past, and take the next simple step to treat the entire flow.