

Presentation
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First Flush and Weep

Roofs and other catchment surfaces quite quickly accumulate dust, leaves, bird droppings and -- especially pollen -- after each rainstorm has washed a collection area clean. In most cases a catchment system design includes a “first flush” provision for discarding the initial dirtier water at the start of a rain -- before storing the remainder.

An adequate roof-cleaning first flush is essential for a potable water system and is usually desirable even if the rainwater is stored for landscape irrigation or other uses not requiring drinking water quality -- such as for laundry or toilet flush. Most irrigation devices such as sprinklers and drip tubes have small orifices at some point which can be clogged if the delivered water is insufficiently filtered. Discarding the dirtier water collected when rainfall begins reduces the loading on strainers and filters downstream -- and the frequency with which they must be cleaned.

This issue is of special importance for In-Ground systems in that diversion of the first flush water and draining of accumulated debris can be more difficult. Also, in a “wet” system, the first flush collection (and drain) point is usually below ground as the leader lines from the gutters may be buried. Access for cleaning is obviously important.

A burning question (really burning if a first flush does not do the job!) is:
How much water should be discarded in the first flush before
beginning to store the rest?

We will review the various rules-of-thumb which address this question. However, the final answer has to be:

“Enough so that neither filters nor anything else needs attention
too soon because of plugging.”

This seemingly trivial aspect of a system can be a source of more frustration than all the rest of the system together. There are quite a number of clever rainwater first flush devices on the market and others are rapidly being added to the equipment choices available to the designer/contractor. So a good choice of device and/or a good maintenance scheme is important.

A first consideration in evaluating a first flush device is whether it can divert enough of the initial collection to drain after each rainfall so that the remainder is clean enough for the design purpose.

A second and overriding concern is whether and how often the first flush device itself will need cleaning in order to operate.

The source of this second concern may not be obvious. It is that after a first flush has done its job and the clean water is being saved, then the device must not interfere unduly with rainfall collection by discarding the now clean water unnecessarily and it must “re-set” itself so that after a rain ends and a dry period follows that it is ready to flush again.

Many designs rely on filling a chamber of some sort to temporarily store the first flush and then slowly draining the chamber to ready for the next rainstorm. However, slow draining generally implies some kind of orifice -- much like the orifices downstream which are to be protected by the first flushing and filters or strainers in the first place. The first flush drain orifice itself is subject to being plugged!

A number of ingenious methods have been devised for keeping the first flush drain clean -- self-cleaning orifices, in-line strainers, etc. It is worthwhile to keep open to new techniques -- it may well be that the perfect solution will be seen here at the conference!

If not perfect, there are yet many good solutions available. If one is coupled with a maintenance plan which is really followed -- we're home free. In a residential situation, perhaps the best way to insure satisfaction and regular maintenance is to thoroughly engage the end user, the customer, in the operation of the system from the beginning. (Submission of a hefty maintenance contract proposal whereby the installer does the cleaning can provide significant motivation for a homeowner to become involved

Customers often assume that they are buying a device, a rainwater collection gadget, which only needs to be plugged in and it will perform without attention or much involvement on his/her part except occasional admiration. It is well to emphasize that rainwater collection is accomplished by a system which is more than a clever collection of components. As with any system, it must be operated -- even if operation requires only little actual attention -- but some.

A first flush device cleaned after each rain event can perform well. Of course, even better is a customer willing to go out in the rain to turn a valve from “drain” to “save” when the water looks clean!

For larger commercial systems, or when budget is not important, a fairly sure technique is to wire a solenoid valve to drain/or save based on a signal

from a turbidimeter. That is, use a mechanical device which measures water clarity -- much as a human can do directly.

The need for extensive flushing at the beginning of a rain event can be reduced by storing the water after minor straining only in a tank within which there is little turbulence and mixing. A very large portion of the dirt load will either settle to the bottom or rise to the top.

In this case, good results can often be obtained by use of floating intake tethered below the debris floating on the surface, but high enough in the tank to leave the settled sediment undisturbed. The cleanest water can be withdrawn from the middle of the storage tank. Combined with periodic surface skimming, and occasional draining from the bottom, this method can work well.