

## **Clogging of Low-flow (volume) Systems**

An aggravating misnomer in the irrigation industry is the labeling of irrigation systems that have emitters with outputs of 5,10,15, etc. gallons per hour as low-volume. In fact these are low-flow emitters, and as a result of being low-flow they are much more prone to clogging. Low-flow emitters have small passageways that can become clogged by inorganic materials (sand, clays, and the chemical precipitates lime and iron) or by organic materials (debris, algae, bacteria, and the slimes they produce). Chemical precipitates are frequently associated with groundwater sources, while organic materials are most common in surface waters. The addition of fertilizers or other chemicals to the system can enhance the potential for clogging. Fertilizer materials containing calcium or phosphates or those increasing the alkalinity of the irrigation water are the most troublesome. Solutions to these clogging problems are based on the causal agent.

### **Physical clogging**

Physical clogging problems can usually be solved by proper filtration of the irrigation water prior to its entry to the distribution system. For waters with large quantities of particulates, adequate filtering capacity is a necessity. Alternative solutions are to use automatic filter flushing when large quantities of particulates are a problem. Chemical treatment of reservoirs to control algae is an appropriate strategy to minimize filter clogging.

Choices of filters include screen filters, disc filters or sand media filters. Screen filters are most effective at removing mineral particulates, while media filters will perform well with both mineral and organic particulates. Disc filters are often a good compromise to media filters, especially in light of their cheaper price.

Filter capacity is just as important as filter choice. An under-capacity filter can quickly clog, reducing flow rates or worse, rupture a screen, allowing sediment into the system. Common solutions to rapid filter clogging are: 1) add more filter capacity, 2) install auto-filtering, and 3) pre-filter the water with a sand separator to reduce sediment going to the filter.

### **Chemical clogging**

Acid injection to reduce water pH, either continuous or intermittent into the irrigation lines, has been the standard method of treating calcium and magnesium carbonate precipitates. The most common compound to lower pH has been sulfuric acid. Safety concerns, though, have reduced its availability. Urea-sulfuric acid fertilizers are a much safer formulation. As a nitrogen source they can be expensive, but as a water conditioner to control precipitation, they can be quite reasonable. Other acids have been used, including hydrochloric and phosphoric. The potential for soil chloride toxicities from hydrochloric acid and the expense of phosphoric have limited their use. Other water treatments include phosphonate products which act to keep calcium and magnesium in solution, preventing precipitation. As yet, there are no reliable remedies for calcium sulfate and silicate precipitates.

### **Biological clogging**

When biological clogging occurs, chlorine gas and hypochlorite solutions (HOCL-) are injected as the most common biocides. Because chlorine is quite toxic, requiring special equipment for pressure regulation and injection, it is usually best to let the gas supplier manage the system. HOCL- potentially could be a problem because of chloride, but concentrations required are low enough that a problem is unlikely. Other biocides available are acrolein compounds and solutions containing copper. These have given good results against algae and bacterial slimes. All of these remedies can be used either once the problem is observed or as a preventative. As a preventative, the required concentration is usually reduced.

A simple expedient to general emitter clogging is probably too simple - flush the lines. Even in the best filtration system, material gets through and can cause clogging. A periodic flushing, at least at the beginning of the irrigation season, should be performed to prevent clogging and insure good application uniformity.