

You Mean You Can Fix It?

Historically, problems with granular media filter underdrains meant incurring major costs and major disruptions in treatment plant operations. Whether underdrain failure is sudden and catastrophic or gradual, starting out with some filter media showing up in a clearwell, in most cases a simple repair is not an option. Because of the way in which most filter underdrain systems are designed and constructed, underdrain installation is most often monolithic and permanent. In that case “repair” means that the underdrain system must be jackhammered out of the filter and a new underdrain system must be constructed.

In contrast to underdrain systems constructed from poured-in-place concrete or grouted-in-place blocks, AWI Phoenix Underdrain Systems are bolted together. In fact, AWI Underdrain Systems are carefully designed so that what has been bolted together can be unbolted making fast and relatively easy repairs possible. Having built its business primarily upon replacing filter underdrain systems supplied by others that have met an untimely demise for one reason or another, AWI has understood since its founding that producing a filter underdrain system that is fixable is much preferred to reaching for a jackhammer.

Almost always, AWI Underdrain Systems get installed with ease - the filters are started up and placed into service without a hitch under the watchful eye of AWI Installation Supervisors. Over time, we almost become complacent but every once in a while a project makes us truly appreciate the advantage of having a filter underdrain system designed to be worked on rather one that has to be demolished so that you can have the pleasure of starting over. Birmingham Water Works’ Western Filter Plant is a case in point.

WESTERN FILTER PLANT

Birmingham Water Works operates four water treatment facilities producing an average of 100 million gallons of treated potable water per day and the Western Filter Plant is one of them. Each of the water treatment facilities uses a traditional flowsheet for surface water treatment including:

- Raw Water Intake
- Chemical Addition
- Rapid Mixing
- Coagulation and Flocculation
- Sedimentation
- Granular Media Filtration
- Disinfection

The Western Filter Plant has three generations of filters including:

AWI WHITE PAPER – YOU MEAN YOU CAN FIX IT?

- Filters 1 through 4 – filters have two cells each – dimensions of each cell are 14 feet 8 inches x 30 feet
- Filters 5 through 8 – filters have a single cell – dimensions are 18 feet x 29 feet 6 inches
- Filters 9 through 16 – filters have a single cell – dimensions are 21' x 29' 6 inches

THE PROBLEM

The filters that proved to be problematical during construction were from the third generation – Filters 9 through 16 – they were Filters 11; 13; and 15. These filters are fed through a bullnose (end) gullet. The compromised filter underdrains that were jackhammered out of the filters during construction were clay tile blocks. Removal of the clay tile underdrains allowed air scour to be retrofitted into the existing filters by running an air header in the gullet.

The AWI Underdrain System was installed as designed by the consulting engineer and the installation went smoothly based upon solid work by the contractor coupled with close supervision by AWI.



Work on three filters was completed and everyone thought they were ready for testing prior to being placed into service. To the horror of the consulting engineer, contractor, and AWI Installation Supervisor, the paint system that was used to cover the concrete in the filters and in particular in the filter gullets then began to blister and peel just as the filters were declared ready for testing. Because installation of the filter underdrains was complete, there was no access to the filter gullets for removal of the defective paint system.

THE FIX

Everyone involved in the Western Filter Plant project understood the nature of the project and the remedial action that needed to be taken. The key to accomplishing that remedial action was

AWI...Leaders in Filter Optimization

quick removal of the AWI Underdrain System by unbolting the underdrain laterals to allow access to the filter gullets. Once the filter gullets were accessible, the coating system was removed from the filter gullets and they were not recoated (based upon this experience and others, AWI now recommends that filter gullets not be coated). The AWI Underdrain System was then reinstalled and the only cost apart from labor was some gasket material and sealant that needed to be replaced during the reinstallation of the underdrain laterals.

Had a false floor or block underdrain system been installed at the Western Filter Plant, failure of the coating system in the gullet would have produced catastrophic results. Under these circumstances, any filter underdrain system that was monolithically poured or grouted in place would have needed to be completely demolished and then reinstalled with all new components. Luckily, that was not the case at the Western Filter Plant.

THE WARRANTY

Over the course of many years and many, many installations, AWI has seen numerous reasons for compromised underdrain systems including not only failed coating systems but also:

- Material in the clearwell from which backwash water is drawn
- Construction debris in backwash circuit piping
- Earthquakes
- Dropping a heavy object on the filter underdrain system from a crane
- A filter sitting empty and having accumulated growth in the backwash circuit slough

Having seen all of these modes of failure, AWI Installation Supervisors take great care to make sure that the source of backwash water is clean and the backwash circuit has been cleared of any debris when commissioning a filter. Nonetheless, failures can occur – just open Google as your browser and search on the words “filter underdrain failure” to see a litany of woe.

Having a problem with a filter underdrain system will always be painful; however, knowing that a problem can be dealt with by moving aside some media and unbolting laterals rather than reaching for a jackhammer is comforting. As we say during presentations for AWI Underdrain Systems:



In fact ease of repair when dealing with AWI Underdrain Systems coupled with demonstrated reliability that is unparalleled in the industry are the reasons why AWI can offer its unique 5 year comprehensive warranty. You may want to ask about that warranty!



AWI...Leaders in Filter Optimization