Underdrain and IMS Cap
Trip Report

Underdrain and I.M.S Cap Report

Filter #6

Sheboygan WTP

Sheboygan, WI

February 14, 2023

Xylem Water Solutions USA, Inc.
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1. Summary

Leopold was contacted by Bill Swearingen (Water Utilities Operations Supervisor) regarding filter #6 at the Sheboygan WTP on January 20, 2023. The plant operations staff noticed a low spot in the filter media in filter #6 “left cell” and a high turbulence area was observed during backwash. The plant staff immediately took this filter off line and removed the filter media to expose the filter underdrains and media retainers. The plant personnel observed caps that were bowed up and in some cases the cap had split due to over pressurization.

Leopold Territory Manager Bruce Wolfe visited the WTP on February 7, 2023 to assess the condition of the Type S filter underdrains, I.M.S Caps and grout that holds the underdrains in place.

2. Background

Filter #6 was installed in 1997 as part of a staged filter rehabilitation by the City of Sheboygan and had the following equipment and filter media:

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Filters #6 – Type S Underdrain with I.M.S Cap media retainer

- 2” of 1.00-2.00mm garnet gravel (bottom layer)
- 3” of 0.20-0.30mm garnet sand
- 12” of 0.45-0.55mm silica sand
- 16” or 18” of 0.95-1.05mm anthracite (top layer)

The filters are dual cell filters with a central backwash flume that separates the two cells. The filter cells will be defined as “left cell” and “right cell” looking from the filter control panel.

3. Inspection

3.1 Visual Inspection of Filter #6

Prior to Leopold site visit the plant staff provide Leopold with pictures and comments of what they observed after removing the filter media. Below is the information provided to Leopold.

Filter 6 IMS Cap Fail

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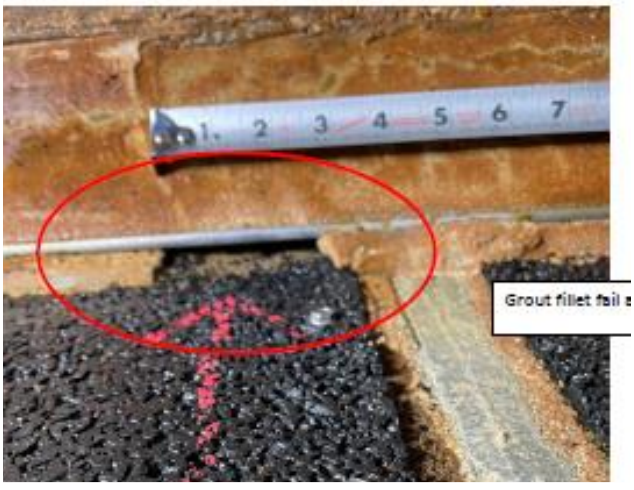

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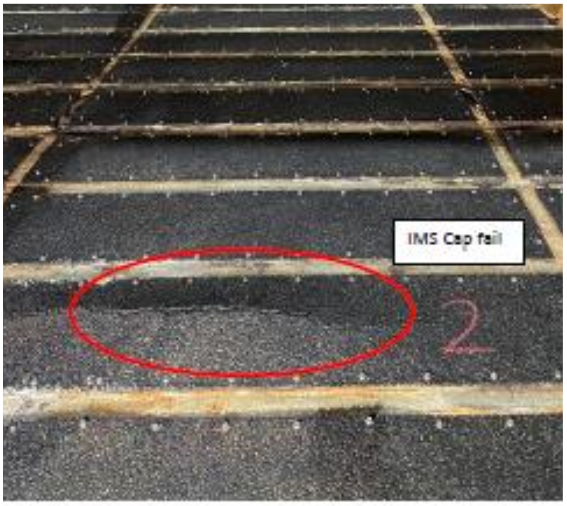

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Several I.M.S Caps were removed prior to Leopold arrival. The caps removed had similar coating as filter #5. The bottom side of the caps had a white coating.

Leopold did a visual inspection on filter #6. The seal breach under the hold down angle as shown on the above photo was the cause of media inflowing into the underdrain primary chamber. The media was then pushed into the filter underdrain laterals during backwash causing the caps top bow upward and, in some cases, split the caps down the middle. Other caps within the filters had screws that were also lifted due to the excessive pressure. The I.M.S Caps at this point are damaged beyond repair and will need to be replaced.

The filter underdrain was then inspected for lifting or separation from the filter floor. There was no evidence that the underdrain was lifted or the filter grout was compromised.

Filter #6 “left cell” had the worst media within the filter underdrain laterals and in some cases the underdrain block was completely full of media. The plant operators and I identified 8 to 10 laterals on the “left cell” of filter #6 that will need extra flushing due to severity of media compaction in the underdrain laterals. This will require large holes to be drilled into the primary and secondary chambers of these effected laterals and extra flushing to remove the media. Leopold will provide a procedure for flushing the “extremely” plugged laterals versus the laterals that have only remnants of media.

3.2 Filter #6 Conclusions

Filter #6 was given a series of visual and structural tests to determine if the Type S filter underdrain installed in 1997 was intact and structurally sound. Investigations concluded that the Type S underdrain blocks were undamaged and adhered to the filter floor.

4. Recommendations

As previously stated, Filter #6 Type S underdrains are in good condition but the I.M.S caps need to be removed and replaced. We recommend a similar procedure to what was done on filter #5. Remove the I.M.S Caps, flush the effected laterals and replace with I.M.S 200 media retainer. This process will provide many additional years of service for the existing system. Leopold will provide a proposal and price for I.M.S. cap replacement with I.M.S. 200 media retainers and field services along with procedures for flushing the underdrains to remove trapped filter media.

See attached “Underdrain Flushing Procedures”.