



## Short Backwash in DOW™ Ultrafiltration

How short backwashes in DOW™ Ultrafiltration can help maximizing the water produced

### Introduction

Optimizing the backwash sequence results of utmost importance since it is the cleaning step that is repeated more times per day [1]. Therefore, a shorter backwash can drastically improve the filtration efficiency, which represents the net water produced by the ultrafiltration plant. Efficiency takes therefore the following considerations into account [2]:

- The water that has not been produced because the unit is stopped due to cleanings
- The water that has already been produced but is consumed during cleanings

### Standard Backwash

DOW™ Ultrafiltration recommended backwash procedure consists of the following five sequential steps [1]:

- The Air Scour (AS), where fibers are shaken with air
- The Draining (D), where the water containing foulants is removed by gravity
- The Backwash Top with Air Scour (BWT+AS), where a backwash with filtrated water is being done together with an air scour as an added option
- The Backwash Bottom (BWB), where a backwash with filtrated water is being performed
- The Forward Flush (FF), where a flushing with feed water is performed

### Short Backwash

The backwash cleaning sequences can be shortened and simplified to the following two steps leading to a significant reduction of the system down-time [2-6]:

- The Backwash Top with Air Scour (BWT+AS), with a duration equal to previous BWT+AS and BWB steps
- The Forward Flush (FF), with the same duration of previous step

This shorter backwash is possible because the total backwash and aeration times are kept constant. This is due to the integration of the former AS and BWB steps are integrated in the new BWT+AS step, which keeps the same cleaning efficiency. Another benefit of the shorter backwash is that less valves changing times and pump ramping times is needed as less steps happens during the backwash sequence.

### Case Study

A case study is presented where the standard backwash is shortened from the following steps [3]:

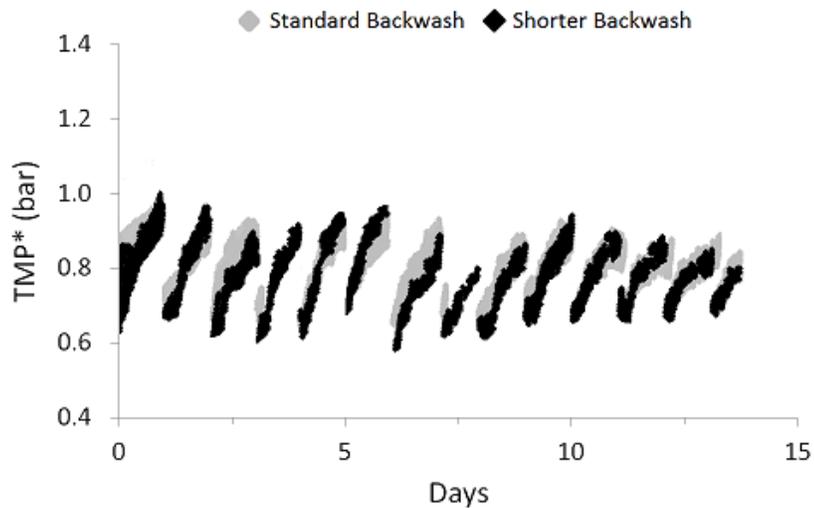
- Air Scour (AS), duration 30 s
- Draining (D), duration 30 s
- Backwash Top with Air Scour (BWT+AS), duration 30 s
- The Backwash Bottom (BWB), duration 30 s
- The Forward Flush (FF), duration 30 s

To the new optimized backwash duration that saves at least 60 seconds of time:

- Backwash Top with Air Scour (BWT+AS), duration 60 s
- The Forward Flush (FF), duration 30 s

Figure 1 shows an example of the application of this shorter backwash cleaning in a seawater desalination plant. It can be observed from the plot that both parallel lines show the same Trans-membrane pressure (TMP) increase over time [3]. This shows that the shorter backwash has the same cleaning efficiency than the standard backwash.

Thanks to this cleaning optimization, the plant could improve its efficiency from 88% to 97% thanks to higher plant availability. This means that the Ultrafiltration could produce 10.2% more water for a given design flux without compromising the rate of fouling. Alternatively, the plant could work at a lower operating flux for a given plant capacity. This represented 5.8% cost savings in the Ultrafiltration plant, and a 1.0% savings in the whole seawater desalination plant that produces 75,000 m<sup>3</sup>/d water at 47.5% recovery [3-4].



**Figure 1. Example of equivalent performance of shorter backwash application**

Although the results from this test have been very satisfactory from a process optimization point of view, this procedure should be reviewed case by case as its application might depend on the feed water quality. More examples can be found in the bibliography for further references [2-6].

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## References

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### DOW™ Ultrafiltration

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