

A close-up photograph of a person's hands holding a clear glass filled with water. The background is slightly blurred, showing the person's face. The text is overlaid on the image in a bold, white, sans-serif font.

# MEET STRINGENT WATER-QUALITY STANDARDS WITH ULTRAFILTRATION

*Case study*

*HYDRAcap® MAX 60 ultrafiltration membranes solve turbidity and microbiological removal issues at a drinking water treatment plant in Spain*

**PROBLEM**

Ter Plant is a Drinking Water Treatment Plant operated by a public company which supplies potable water to a population of 4.5 million inhabitants in the region of Catalunya (Spain). Ter DWTP is a conventional treatment plant with clarifiers and granular activated carbon filters with a maximum treatment capacity of 8 m<sup>3</sup>/s. The plant operator required Hydranautics to study together the convenience to include ultrafiltration technology (HYDRAcap™ MAX) which can partially (2 m<sup>3</sup>/sec) substitute the clarification and filtration steps and on the other hand treat the wastewater produced from the media filters backwash and increase the sanitary guarantee of recycled water of the process which is delivered to the inlet of the plant.

The customer was interested in upgrading the plant process in many aspects, that is to resolve issues like: high chemical reagents consumption, optimization of the granular activated carbon filters which occasionally became a bottle neck in the process, punctuality problems with feed conditions including TOC, algae, geosmin, emerging organic compounds and disinfection by-products. Moreover, there was the need to increase the water recovery by treating and reusing the wastewater of the plant as well as the need to improve the quality of the reclaimed wastewater that is recycled to the inlet of the plant.



<i>Location</i>	Barcelona, Spain
<i>Feed Source</i>	Ter river, Pasteral dam
<i>Application</i>	Drinking water
<i>Startup Date</i>	1966
<i>Design</i>	Clarifiers, granular activated carbon filters

<i>Capacity Ter DWTP</i>	Maximum: 8 m <sup>3</sup> /s (691,000 m <sup>3</sup> /day)
<i>Capacity Pilot Plant</i>	12.5 - 9.3 - 5.5 m <sup>3</sup> /h
<i>Pilot Testing Period</i>	July 2017 - September 2018
<i>Design Pilot Plant</i>	400 µm screen filter, 2 modules HYDRAcap® MAX 60

The

## SOLUTION

Hydranautics addressed the challenges experienced by the client through three consecutive pilot studies with HYDRAcap™ MAX technology (UF) utilized at different treatment points. The Hydranautics pilot plant was equipped with two HYDRAcap™ MAX 60 modules in single rack configuration. Upstream of the modules, a 400-micron screen filter was used to remove the big size particulate matter. The UF plant was configured to treat 3 different types of water at 3 different sites by changing flux, filtration time, and maintenance cleaning frequencies. The pilot plant was fed with clarified water, raw water without any pre-treatment, and wastewater generated from backwashing filters and purging clarifiers.

In the first test (treating clarified water), a 70% turbidity reduction was obtained. Microbiological parameters and some residual aluminum from coagulation process were also removed.

In the second part of the study (directly treating raw water), a 92% turbidity reduction was obtained. In addition, physical disinfection of the filtered water was observed as all bacteria and protozoa were removed. Moreover, for this case, organic matter was 12% removed. Iron and manganese concentrations in the UF filtrate were similar to that of the product water from DWTP, while the aluminum concentration was lower in the UF filtrate. Lastly, in this case, the HYDRAcap™ MAX was observed to have better filtrate turbidity when compared to the clarified water even without additional chemical dosing, so the operator manifested interest on installing HYDRAcap™ MAX to treat raw water instead of clarified water.

In the third part of the study (treating wastewater generated from backwashing filters and purging clarifiers), a turbidity reduction of 84% was obtained as well as physical disinfection removing all bacteria and protozoa. Additionally, it successfully increased overall recovery in the process. treating raw, clarified and residual water to increase recovery in the process.

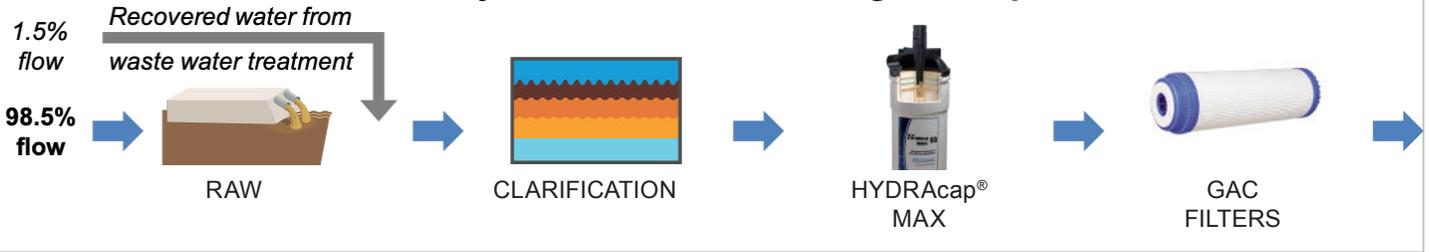
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## IMPACT

The results obtained from the tests in 2017 and 2018 in DWTP showed that HYDRAcap™ MAX is a robust and compact technology. It can work with water from different origins and characteristics, while maintaining good, consistent permeate quality. Furthermore, the result showed that the incorporation of HYDRAcap™ MAX to the current process improved the treated water with reduced turbidity and microbiological burden downstream even without using additional chemical reagents in the water. Lastly, overall HYDRAcap™ MAX enhanced the water recovery by treating the plants wastewater. Thus, HYDRAcap™ MAX turned out to be a viable option to implement in DWTP treatment process totally or partially.

In view of the test results, the customer has considered the implementation of HYDRAcap™ MAX technology in the current process, being one of the most promising options to treat raw and wastewater. When treating the clarified water, reduction of turbidity and aluminum levels were valued by the customer. While treating the raw water, operational and filtrate quality was stable. Even though no chemicals were dosed to the feed water, turbidity values of UF filtrate water were found to be lower than the turbidity of clarified and carbon filtered water. Physical disinfection was achieved without chemicals which represents a reduction of DBPs generated. For the next rehabilitation plant, UF can replace part of the actual treatment improving the overall recovery.

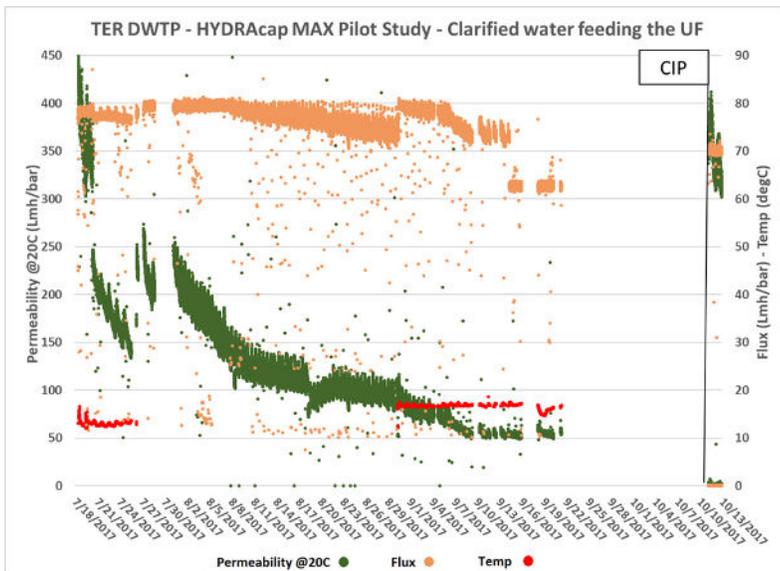
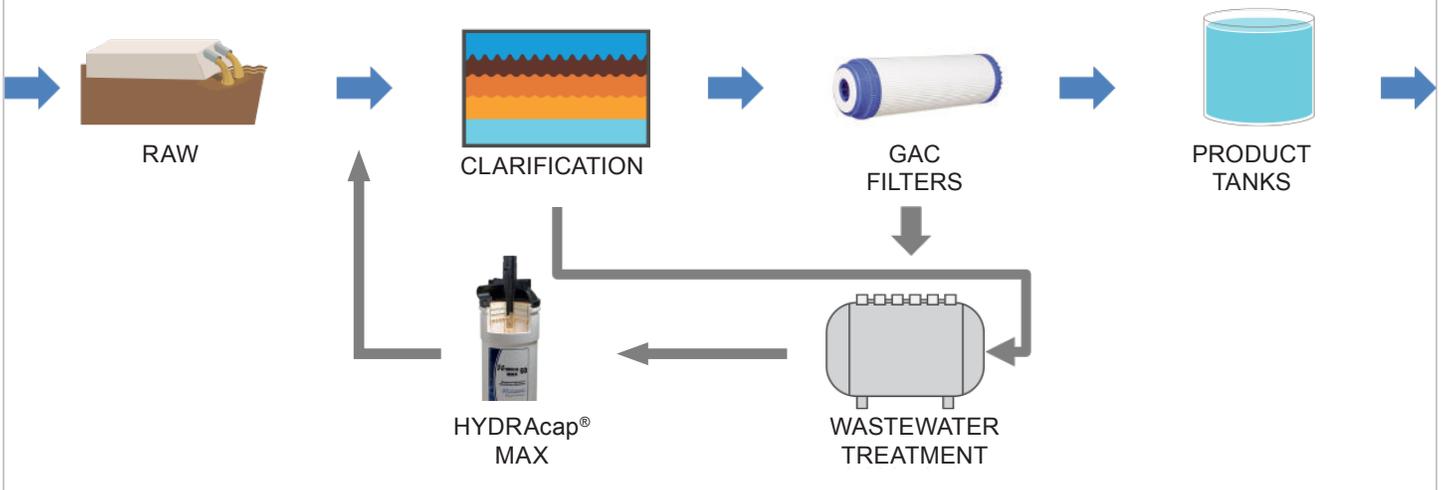
### 1st Study – Clarified water feeding the UF pilot

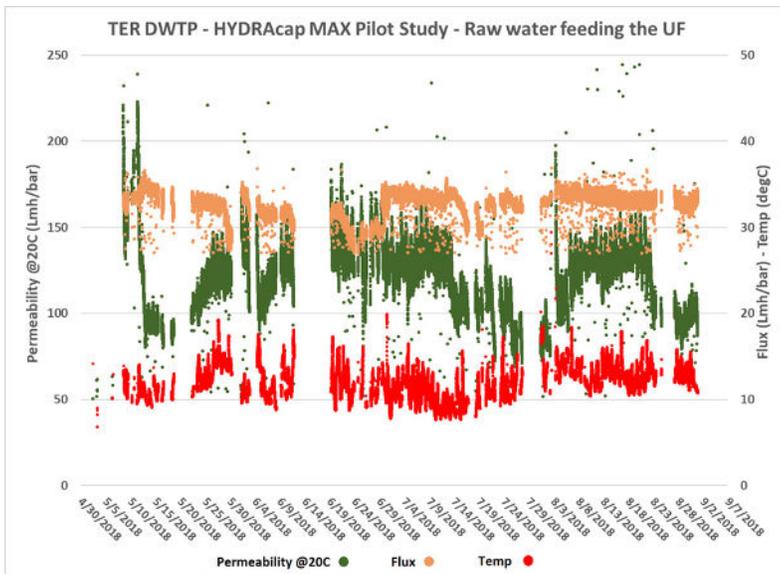
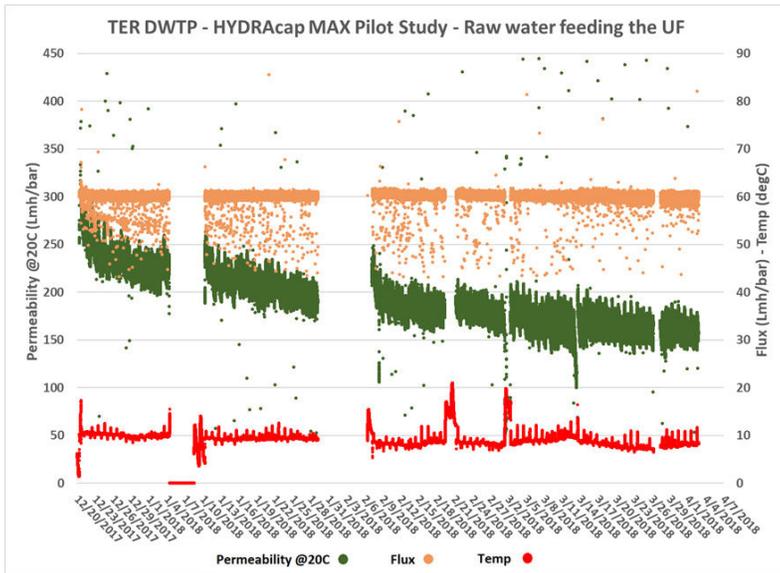


### 2nd Study – Raw water feeding the UF pilot



### 3rd Study – Waste water feeding the UF pilot





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### About Hydranautics

Since our founding in 1963, Hydranautics has been committed to the highest standards of technology research, product excellence and customer fulfillment. Hydranautics entered the Reverse Osmosis (RO) water treatment field in 1970 and is now one of the global leaders in Integrated Membrane Solutions. Hydranautics became a part of the Nitto Group in 1987. Nitto is Japan's leading diversified materials manufacturer. The group offers over 13,000 high value specialty products worldwide including optical films for liquid crystal displays, automotive materials, reverse osmosis membranes for desalination and transversal drug delivery patches.

As leaders of high quality membrane solutions, we believe our commitments extend beyond manufacturing and selling our products. Our skilled staff of technicians, engineers and service professionals assist in designing, operating and maintaining a robust, reliable and efficient membrane system to meet your requirements and exceed your expectations.