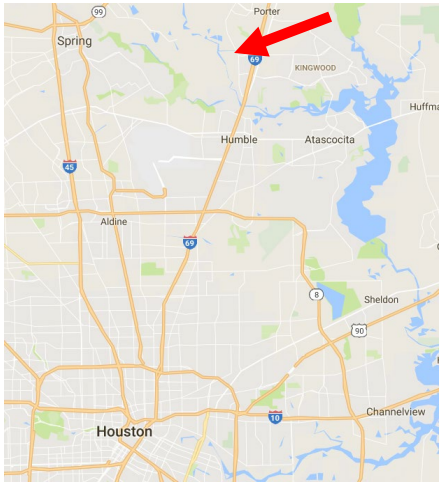
Drinking Water Pilot Case History:
Surface Water – Porter, TX

Background

Porter, Texas has conducted simultaneous membrane filtration surface water pilots to compare the cost and performance of four major membrane technology suppliers for a new 4+ MGD Drinking Water Plant. Surface water is drawn from a reservoir hydraulically linked to the San Jacinto River, upstream of Lake Houston. A unique feature of the test program is that no membrane pretreatment is provided. The location of the pilot and the intake are shown below.



Test Program Set Up

Four pilot plants arrived on site in summer of 2019. These plants were operated by the city and the pilot program was managed by Ardurro Consulting Engineers.

Figure 1: Test Setup in order Toray, Pall, Koch, Purifics

Full Scale Solution

The pilot is complete and the next phase is full scale design with a Cuf DM64 as baseline.

Comparative Performance

TCEQ requires a 90-day pilot in 3 stages. Stage one is optimization, stage two is a 30-day sustained operating period at optimized parameters (i.e. TMP, Flux, coagulant type and dose), and stage three is a minimum 10-day period to demonstrate membrane integrity no irreversible membrane fouling has occurred.

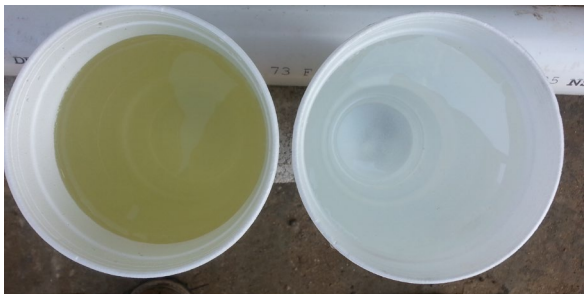
Purification Parameter	Toray	Pall	Koch	CUF
Flux (GFD/LMH)	20*/34	60*/101.9	54*/91.7	287/487.3
Filtration Cycle (min)	15-30	~ 15-30	~ 15-30	~30,000**
Turbidity (Feed 150) NTU	0.036	0.012		0.013
TOC (Feed 6) ppm	3.7	4.3	4.3	2.5
TOC* (Feed 8) ppm**	6	6		2

** May or may not be corrected for backwash. ** Operating 21 days between rinses for 30 days sustained test trial at rated flux. *** 2017 data.*

Cuf Performance: Stage 2: 30-Day Sustained Operating Period Average

Parameter	Units	Raw	Post CUF
Turbidity	NTU	116.8	0.0174
pH	-	6.1	6.1
Alkalinity	mg/L (as $CaCO_3$)	23.1	24.2
Temperature	°C	20.3	21.5
TOC	mg/L	3.53	1.63
DOC	mg/L	3.23	1.53
UV-254	cm^{-1}	0.073	0.039
True Color	PCU	11.0	ND
Total Hardness	mg/L (as $CaCO_3$)	19.0	18.8
Total Fe	mg/L	2.016	ND
Total Mn	mg/L	0.056	ND
Al	mg/L	6.99	0.015
Si	mg/L	11.39	3.29
TDS	mg/L	51.6	57.2
TSS	mg/L	131.4	NS

The Purifics Cuf process demonstrated the best, longest and most consistent performance.



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