

Drinking Water Case History:

NO₃, FI, As Removal



Challenge – NO₃, FI, As Removal

A west Texas community receives its drinking water from a number of wells which have Fluoride, Nitrates and Arsenic levels above MCLs. Although *Cuf* (Ceramic Ultra Filtration) can remove arsenic and fluoride, RO (Reverse Osmosis) is required to reduce the nitrate below MCLs. Integrating the *Cuf* system to RO provides superior pre-treatment to the RO system as it removes RO foulants and provides a pristine feed to the RO system. *Cuf* provides a consistent feed with no upsets. This optimizes RO performance and reduces RO cleaning and membrane replacement.

Background

In 2014 a successful pilot verification program was performed using *Cuf* (Ceramic Ultra Filtration) pretreatment and RO (Reverse Osmosis) which demonstrated sustained purification of FI, As and NO₃ below MCLs and provided the necessary data for regulatory approval for full scale implementation. Regulatory approval was received and the full scale system is now in production.

Pilot Performance

During the sustained test program the pilot operated at a flux of nominally 220 GFD with TMP varying between 3-15 psi. The *Cuf* system operated for 200 hours between TMP maintenance rinses.

Parameters (ppm)	Raw Water	RO Permeate
Arsenic	0.04	< 0.01
Fluoride	4.63	< 0.5
Nitrates	6.5	1.4
Total Hardness as CaCO ₃	560	0.6
Total Dissolved Solids (TDS)	868	48
Sulfate	259	< 2.6
Chloride	102	0.6

Plant Capability

The new plant will be capable of producing 1,000,000 gal/day for drinking water distribution. The *Cuf*/RO system will accept water from any combination of wells and flow rates to produce water with the quality as shown above. The finished water will be a blend consisting of 15% of the feed water to the RO permeate to provide an appropriate hardness level of nominally 80 ppm.

Capital Works

In 2015 the purification process was approved by the state regulator (Texas Commission on Environmental Quality [TCEQ]). This plant is now under construction and to be operational Q2 2017.



Figure 1: Integrated CUF/RO System in Production



Figure 2: Building & Installation

Other Benefits

- Reduced operator involvement, the entire process is automated and only audited.
- The *Cuf* provides very pristine and consistent feed water to the RO for enhanced RO membrane life and reduced cleaning requirements.
- For additional information reference document DOC3019 - *Cuf* Ceramic Ultra Filtration.
- NSF/ANSI 61

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